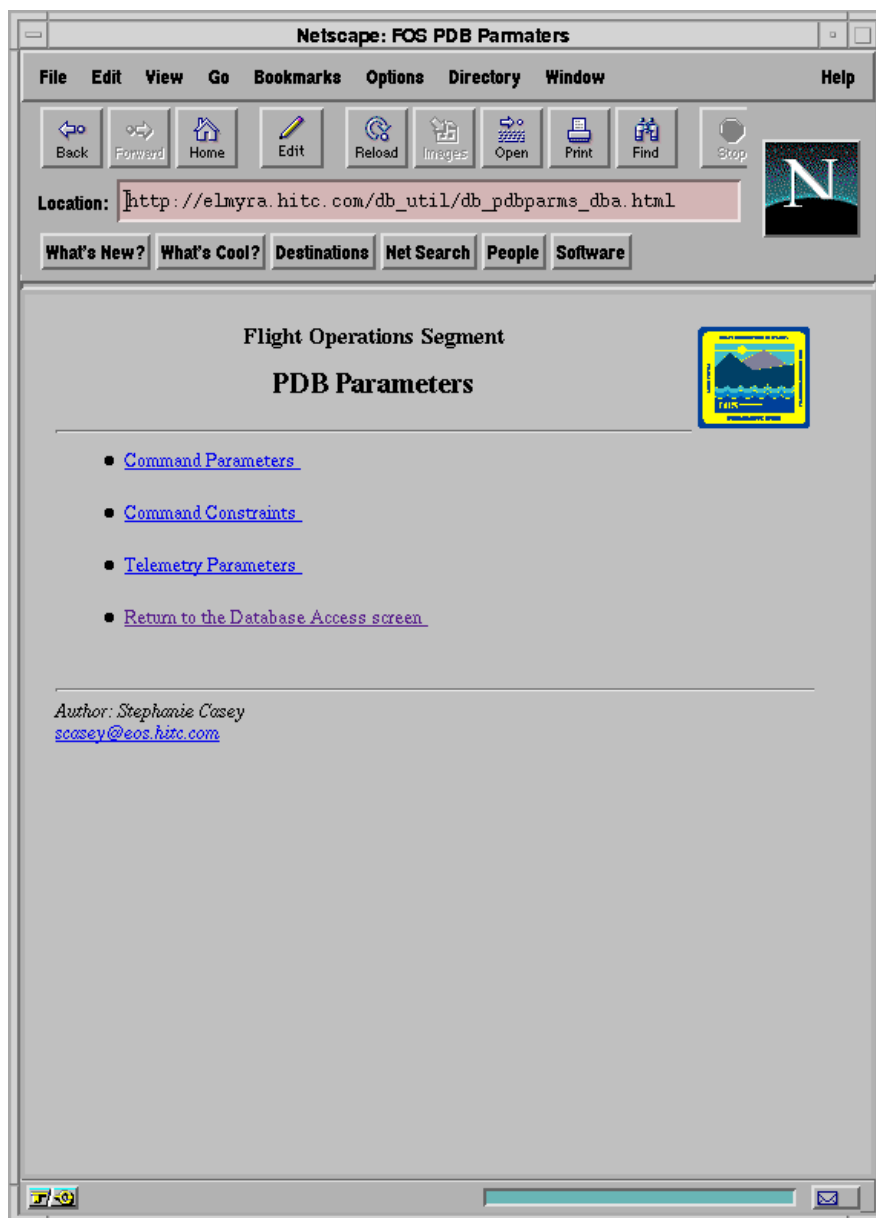


#### 10.4.4.4 PDB Parameters

Open the PDB Parameters page (see Figure 10.4.4.4-1) by clicking **PDB Parameters** on the Database Access page. This section directly relates to the FOS AM1 Data Format Control Document (DFCD). The DFCD will contain related information that may be useful as a reference.



**Figure 10.4.4.4-1. PDB Parameters Page**

#### 10.4.4.4.1 Command Parameters

Open the Command Parameters page (see Figure 10.4.4.4.1-1) by clicking **Command Parameters** on the PDB Parameters page.



**Figure 10.4.4.4.1-1. Command Parameters Page**

- A. **Command Parameter Specification.** Open the Command Parameter Specification page (see Figure 10.4.4.4.1-2) by clicking **Command Parameter Specification** on the Command Parameters page. The Command Parameter Specification Record defines a spacecraft or instrument command used to support the EOS spacecraft. Each record

provides the construction information for a command. The following is a list of fields associated with the Command Parameter Specification Record:

1. **Command Parameter Identifier.** This number uniquely identifies the spacecraft or instrument command parameter.
2. **Command Mnemonic.** Identifies each spacecraft or instrument command parameter. The command mnemonic is a unique name consisting of 14 to 20 characters representing a spacecraft or instrument command for the EOS spacecraft. The format is as follows:

AAA\_<Command Verb>\_<Command Name>

where:

AAA is the three uppercase characters representing spacecraft subsystem or instrument;

**<Command Verb>:** 3 to 9 uppercase characters representing the command verb; valid values for the EOS spacecraft include:

ACTIVATE

ARM

BOOT

CHANGE

CLOSE

DISABLE

DISARM

DRIVE

DUMP

ENABLE

FIRE

FLYBACK

FORCEOFF

FORCEON

GET

HALT

IGNORE

INITIATE

LOAD  
MLOAD  
MOVE  
OPEN  
PASS  
PERFORM  
RESET  
SELECT  
SET  
SLEW  
STEP  
TOGGLE  
TURN\_OFF  
TURN\_ON  
USE

**<Command Name>** specifies 6 to 12 uppercase characters representing the command name describing the function to be performed onboard the spacecraft. The actual length of the command name is dependent on the command verb.

3. **Command Type.** Command classification with respect to the Remote Terminal (RT) and end component interface.
4. **Remote Terminal (RT) ID Name.** The name of the remote terminal to which a command is sent to over the 1553 Command and Telemetry (C&T) bus.
5. **RT subaddress Name.** The name of the remote terminal subaddress the command is sent to.
6. **Command Word Count.** The number of 16-bit words following the command destination (1553 message header) in the command structure. The command descriptor and optional command data words are included in this count. A value greater than 1 indicates command data words exist.
7. **Command Data Word Type.** The source of the command data, where:

F = FIXED; assembled from a fixed bit pattern.

V = VARIABLE; user specified.

A FIXED command data word type would indicate the presence of fixed type command data words associated with the command. A VARIABLE command data word type may also contain a fix part of the bit pattern and therefore would have both fixed and variable type command data words.

8. **Safety Level.** Indicates whether the command is critical to the spacecraft hardware and/or personnel. Valid values include:

H = Critical

S = Safe.

E = Exclude. The command is to be excluded from the command process (is used to indicate a hazardous command).

O = One time only. Indicates commands that are sent one time only (i.e., Launch). Then the command should be marked with safety level E.

**Netscape: Command Parameter Specification**

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**Flight Operations Segment**

**Command Parameter Specification**

◆ Command Parameter

Command Mnemonic:	<input type="text"/>	Command Parameter Id:	<input type="text"/>
Command Type:	<input type="text"/>	Remote Terminal Id:	<input type="text"/>
Word Count:	<input type="text"/>	Data Word Type:	<input type="text"/>
Remote Terminal Subaddress:	<input type="text"/>	Safety Level:	<input type="text"/>

Clear Form

**Access Method**

◆ Find

◆ Add

◆ Update

◆ Remove

Add / Update / Remove Password:

**Figure 10.4.4.4.1-2. Command Parameter Specification Page**

9. **Command Execution Verification (CEV) Specification Record.** Open the Command Execution Verification (CEV) page (see Figure 10.4.4.4.1-3) by clicking **Command Execution Verification Specification** on the Command Parameters page.

The screenshot shows a Netscape browser window with the title "Netscape: Command Execution Verification Specification". The address bar shows the URL "http://elmyra.hitc.com/Command/CommandCev.html". The page content is titled "Flight Operations Segment" and "Command Execution Verification Specification". It features a form for specifying command execution verification parameters. The form includes fields for "Command Mnemonic", "Command Parameter Id", "CEV Mnemonic", "DN/EU Indicator", "CEV Low Value", "CEV High Value", "CEV State", "CEV Timeout", and "CEV Mask". There is a "Clear Form" button below the form. Below the form is a section titled "Access Method" with radio buttons for "Find", "Add", "Update", and "Remove". At the bottom, there is a field for "Add/Update/Remove Password".

**Figure 10.4.4.4.1-3. Command Execution Verification Specification Page**

The CEV Specification Record defines a telemetry parameter used to verify the reception and execution of an associated command by the spacecraft subsystem or instrument. Each command parameter may specify one analog or discrete telemetry parameter to verify

execution. A range of values in which the telemetry parameter must occur is specified to verify command execution. To indicate an exact value for the telemetry parameter, the low value and high value must be equal. The following is a list of fields associated with the Command Execution Verification Record:

1. **Command Parameter Identifier.** The number uniquely identifying the spacecraft or instrument command parameter. This value must be specified in the Command Parameter Specification PDB.
2. **Command Mnemonic.** The name of the command parameter. This value must be specified in the Command Parameter Specification PDB in combination with the command parameter ID.
3. **CEV Mnemonic.** The telemetry parameter whose value verifies the receipt and execution of the command. This name must be specified in the Telemetry Description PDB.
4. **DN/EU Indicator.** The units the CEV mnemonic is defined as (i.e., raw data number or engineering units), where:

DN = raw data number

EU = engineering units

This field is only used for analog telemetry parameters, therefore the telemetry parameter must be of type analog. Additionally, a CEV mnemonic expressed in engineering units must also have an associated definition in the Polynomial Coefficients Specification PDB.

5. **CEV Low Value.** The lowest acceptable value, inclusive, of the CEV mnemonic to verify the command has been properly executed onboard the spacecraft. This value cannot be greater than the CEV high value. The format for this field is determined by the DN/EU indicator. A DN/EU indicator set to DN indicates this value will be defined as a raw data number and contains a decimal integer. A DN/EU indicator set to EU indicates this value will be defined in engineering units and contains a floating-point number.
6. **CEV High Value.** The highest acceptable value, inclusive, of the CEV mnemonic to verify the command has been properly executed onboard the spacecraft. This value cannot be less than the CEV low value. The format for this field is determined by the DN/EU indicator. A DN/EU indicator set to DN indicates this value will be defined as a raw data number and contains a decimal integer. A DN/EU indicator set to EU indicates this value will be defined in engineering units and contains a floating-point number.
7. **CEV Time Out.** The maximum time in seconds for verification of the transmitted command to occur before it is considered failed.
8. **CEV Mask.** The bit pattern in hexadecimal format logically combined with the expected value and the value of the telemetry point used to verify the command. The mask concept provides the capability to have a multi-bit telemetry point serve as the

CEV mnemonic for a command that will only cause 1 bit of the multi-bit point to change.

9. **CEV State.** The text associated with the CEV mnemonic used to verify command execution. This value will override the use of the expected value (fields 5 and 6) when both are specified.

- B. **Command Fixed Data Specification.** Open the Command Fixed Data Specification page (see Figure 10.4.4.4.1-4) by clicking **Command Fixed Data Specification** on the Command Parameters page.

The screenshot shows a Netscape browser window titled "Netscape: Command Fixed Data Specification". The address bar contains the URL "http://elmyra.hitc.com/Command/CommandFixData.html". The page content is organized into sections. At the top, there is a "Flight Operations Segment" header with a small graphic. Below this is the "Command Fixed Data Specification" section. It contains a "Command Fixed Data" subsection with four input fields: "Command Mnemonic", "Command Parameter Id", "Word Number", and "Data Value". A "Clear Form" button is located below these fields. The "Access Method" section follows, featuring four radio buttons labeled "Find", "Add", "Update", and "Remove". Below the radio buttons is a text input field for "Add / Update / Remove Password". A "Submit" button is positioned at the bottom of the form. The footer of the page credits the author as "Dave Peters" with the email "dpeters@eos.hitc.com".

**Figure 10.4.4.4.1-4. Command Fixed Data Specification Page**



The Command Fixed Data Specification Record defines the data words (1-N) associated with the fixed bit pattern of a command. Word 1 would represent the command destination and word 2 represents the command descriptor. The following is a list of fields associated with the Command Fixed Data Word Specification:

1. **Command Parameter Identifier.** The number uniquely identifying the spacecraft or instrument command parameter. This value must be specified in the Command Parameter Specification PDB.
2. **Command Mnemonic.** The name of the command parameter. This value must also be specified in the Command Parameter Specification PDB in combination with the command parameter ID.
3. **Word Number.** The order of data words associated with a command. Valid values are 0 to 31.
4. **Command Data Value.** The fixed bit pattern of the data word in hex.

- C. **Command Description Specification.** Open the Command Description Specification page (see Figure 10.4.4.4.1-5) by clicking **Command Description Specification** on the Command Parameters page.

The Command Description Record provides descriptive information concerning a spacecraft or instrument command parameter. The following is a list of fields associated with the Command Description Record:

1. **Command Parameter Identifier.** The number uniquely representing the command parameter. This value must also be specified in the Command Parameter Specification PDB.
2. **Command Mnemonic.** The name of the command parameter. This value must also be specified in the Command Parameter Specification PDB in combination with the command parameter ID.
3. **Major Assembly.** The name of the spacecraft major assembly containing the component receiving the command.
4. **Component Name.** The spacecraft component receiving the command.
5. **Subassembly Name.** The name of the subassembly within the component that will be affected by the command. This value is not required by all commands.
6. **ATC Inhibit ID.** The inhibit group of the command.
7. **Store Command Indicator.** Indicates whether the command is executable from the ATC or RTS buffer, where:  
0 = false, not executable.  
1 = true, executable.
8. **Pseudo Operations Frequency.** The type of command, where:  
0 = normal.  
1 = activate RTS.  
2 = jump.

- 3 = no op.  
4 = halt.
9. **Command Description.** Textual information describing the spacecraft or instrument command.

The screenshot shows a Netscape browser window titled "Netscape: Command Description Specification". The address bar shows the URL "http://elmyra.hitc.com/Command/CommandDesc.html". The page content is titled "Flight Operations Segment Command Description Specification". It features a form with the following fields:

- Command Description (header)
- Command Mnemonic:
- Major Assembly:
- Component Name:
- ATC Inhibit Id:
- Pseudo Ops:
- Command Parameter Id:
- Subassembly:
- Command Description:
- Stored Command Indicator:

Below the form is a "Clear Form" button. At the bottom, there is an "Access Method" section with three radio buttons: Find, Add, and Update.

**Figure 10.4.4.4.1-5. Command Description Specification Page**

- D. **Command Prerequisite State Specification Record.** Open the Command Prerequisite State Specification page (see Figure 10.4.4.4.1-6) by clicking **Command Prerequisite State Specification** on the Command Parameters page.

**Netscape: Command Prerequisite State Specification**

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**Flight Operations Segment**

**Command Prerequisite State Specification**

---

◆ **Command Prerequisite State**

Command Mnemonic:  Command Parameter Id:

Prerequisite Mnemonic:  DN/EU Indicator:

Prerequisite Low Value:  Prerequisite High Value:

---

**Access Method**

◆ Find

◆ Add

◆ Update

◆ Remove

Add / Update / Remove Password:

**Figure 10.4.4.4.1-6. Command Prerequisite State Specification Page**

The Command Prerequisite State Specification Record defines the condition for which a telemetry parameter associated with a command must occur in order to perform prerequisite state checking. Each command may specify up to 4 analog or discrete telemetry parameters with an associated range of values. A command will be transmitted only if all telemetry parameters defined for this command fall within their specified range. To indicate an exact value for the telemetry parameter, the low value and high value must be equal. The following is a list of fields associated with the Prerequisite State Specification:

1. **Command Parameter Identifier.** The number uniquely identifying the spacecraft or instrument command parameter. This value must be specified in the Command Parameter Specification PDB.
2. **Command Mnemonic.** The name of the command parameter. This value must also be specified in the Command Parameter Specification PDB in combination with the command parameter ID.
3. **Prerequisite Mnemonic.** The telemetry parameter whose value is used in determining whether the command is to be transmitted. This value must also be defined in the Telemetry Description PDB.
4. **DN/EU Indicator.** The units the prerequisite mnemonic is defined as (i.e., raw data number or engineering units), where:

DN = raw data number.

EU = engineering units.

This field is only used for analog telemetry parameters, therefore the telemetry parameter must be of type analog. Additionally, a prerequisite mnemonic expressed in engineering units must also have an associated definition in the Polynomial Coefficients Specification PDB.

5. **Prerequisite Low Value.** The lowest acceptable value, inclusive, of the prerequisite mnemonic to verify the condition for sending the associated command. This value cannot be greater than the high value. The format for this field is determined by the DN/EU indicator. A DN/EU indicator set to DN indicates this value will be defined as a raw data number and contains a decimal integer. A DN/EU indicator set to EU indicates this value will be defined in engineering units and contains a floating-point number.
6. **Prerequisite High Value.** The highest acceptable value, inclusive, of the prerequisite mnemonic to verify the condition for sending the associated command. This value cannot be less than the CEV low value. The format for this field is determined by the DN/EU indicator. A DN/EU indicator set to DN indicates this value will be defined as a raw data number and contains a decimal integer. A DN/EU indicator set to EU indicates this value will be defined in engineering units and contains a floating-point number.

- E. **Command Variable Data Specification.** Open the Command Variable Data Specification page (see Figure 10.4.4.4.1-7) by clicking **Command Variable Data Specification** on the Command Parameters page.

The Command Variable Data Specification Record defines the subfields associated with variable type commands. Each subfield defines a parameter associated with a command that may be specified at execution time. Each command of variable type may reference up to 10 subfield names. The subfield defaults are used to overwrite the fixed data words. If there is no default specified then the subfield value must be provided at the time of execution. Optional conversion equation and up to 10 state names may be associated with

each subfield. A third order polynomial may be used to reverse calibrate an input subfield value from an EU to a DN using the following equation:  $DN = C0 + C1*EU + C2*EU**2 + C3*EU**3$ .

**Netscape: Command Variable Data Word Specification**

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Location: <http://elmyra.hitc.com/Command/CommandVarData.html>

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**Flight Operations Segment**

**Command Variable Data Specification**

Command Variable Data

Command Mnemonic:  Command Parameter Id:

Subfield Name:  Default Value:  Subfield Length:  Min Subfield Value:

Destination First Bit:  Destination Last Bit:  Units:

Conversion Group #1:  Start EU #1:  Conversion Group #2:  Start EU #2:

State #1:  State Value #1:  State #2:  State Value #2:

State #3:  State Value #3:  State #4:  State Value #4:

State #5:  State Value #5:  State #6:  State Value #6:

State #7:  State Value #7:  State #8:  State Value #8:

State #9:  State Value #9:  State #10:  State Value #10:

Clear Form

**Figure 10.4.4.4.1-7. Command Variable Data Specification Page**

The following fields are included on the Command Variable Data Word Specification page:

1. **Command Parameter Identifier.** The number uniquely identifying the spacecraft or instrument command parameter. This value must be specified in the Command Parameter PDB.
2. **Command Mnemonic.** The name of the command parameter. This value must also be specified in the Command Parameter Specification PDB in combination with the command parameter ID.
3. **Subfield Name.** The name of a subfield associated with a variable type command.
4. **Default Value.** The value to be used if no value is specified when the command is issued. This value is represented as a Data Number (DN).
5. **Subfield Length.** The number of bits constituting the subfield value within the command bit pattern. Valid values are 1 to 32.
6. **Destination First Bit.** The first bit of the command bit pattern where the subfield value will be inserted in the command data message (integer).
7. **Destination Last Bit.** The last bit of the command bit pattern where the subfield value will be inserted in the command data message (integer).
8. **Minimum Value.** 13 character floating point value representing the lower bound for the associated state of the subfield value range.
9. **Maximum Value.** 13 character floating point value representing the upper bound of the subfield value range.
10. **Units.** The abbreviation for the engineering units to which a command subfield value is converted from.
11. **Conversion Group Number 1.** The number uniquely identifying a set of coefficients associated with an unsegmented 3rd order polynomial equation to be used when the subfield value is greater than or equal to the start EU number 1 (field 12), and less than the start EU number 2 (field 14). This value must be defined in the Polynomial Coefficients Specification PDB. The equation used to reverse calibrate is as follows:  $DN = C0 + C1*EU + C2*EU**2 + C3*EU**3$ .
12. **Start EU number 1.** The lower bound of values for conversion group number 1.
13. **Conversion Group Number 2.** The number uniquely identifying a set of coefficients associated with a conversion equation to be used when the subfield value is greater than or equal to start EU number 2. This value must be defined in the Polynomial Coefficients Specification PDB.
14. **Start EU Number 2.** The lower bound of values for conversion group number 2.
15. **State Name 1.** The state associated with the subfield.
16. **State Value 1.** The value to be inserted into the command bit pattern when the user enters state name 1.

17. **State Names 2 to 10.** The state associated with subfields 2 to 10.

18. **State Values 2 to 10.** The value to be inserted into the command bit pattern when the user enters state names 2 to 10.

#### **10.4.4.4.2 Command Constraints**

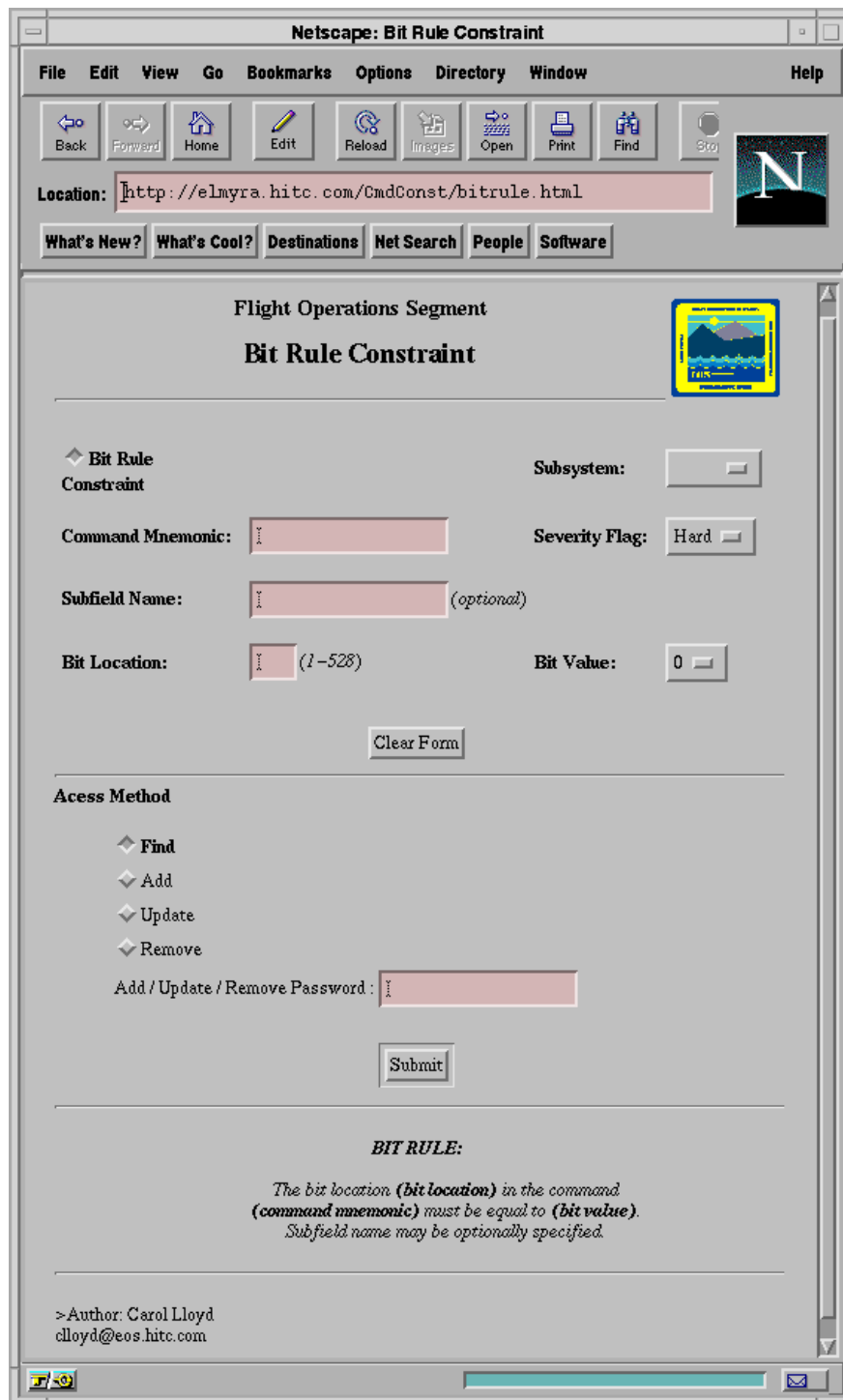
Open the Command Constraints page (see Figure 10.4.4.4.2-1) by clicking **Command Constraints** on the PDB Parameters page. A command parameter listing may be obtained for AM1 commands by selecting all subsystems or a specific subsystems and clicking the Command Parameter Listing 'Generate' button. The user may also view all the constraints for a given cmd mnemonic by clicking on the generate button. The Command Mnemonic specified on the individual constraint windows act as a trigger. This trigger mnemonic that causes the constraint to be evaluated and the trigger is the mnemonic that is used in the constraint evaluation.



**Figure 10.4.4.4.2-1. Command Constraints Page**

- A. **Bit Rule Constraint.** Open the Bit Rule Constraint page (see Figure 10.4.4.4.2-2) by clicking **Bit Rule Constraint** on the Command Constraints page.





**Figure 10.4.4.4.2-2. Bit Rule Constraint Page**

The Bit Rule Definition Record provides the criteria used when performing the constraint check that ensures the value of the trigger command's subfield bits satisfy the condition of

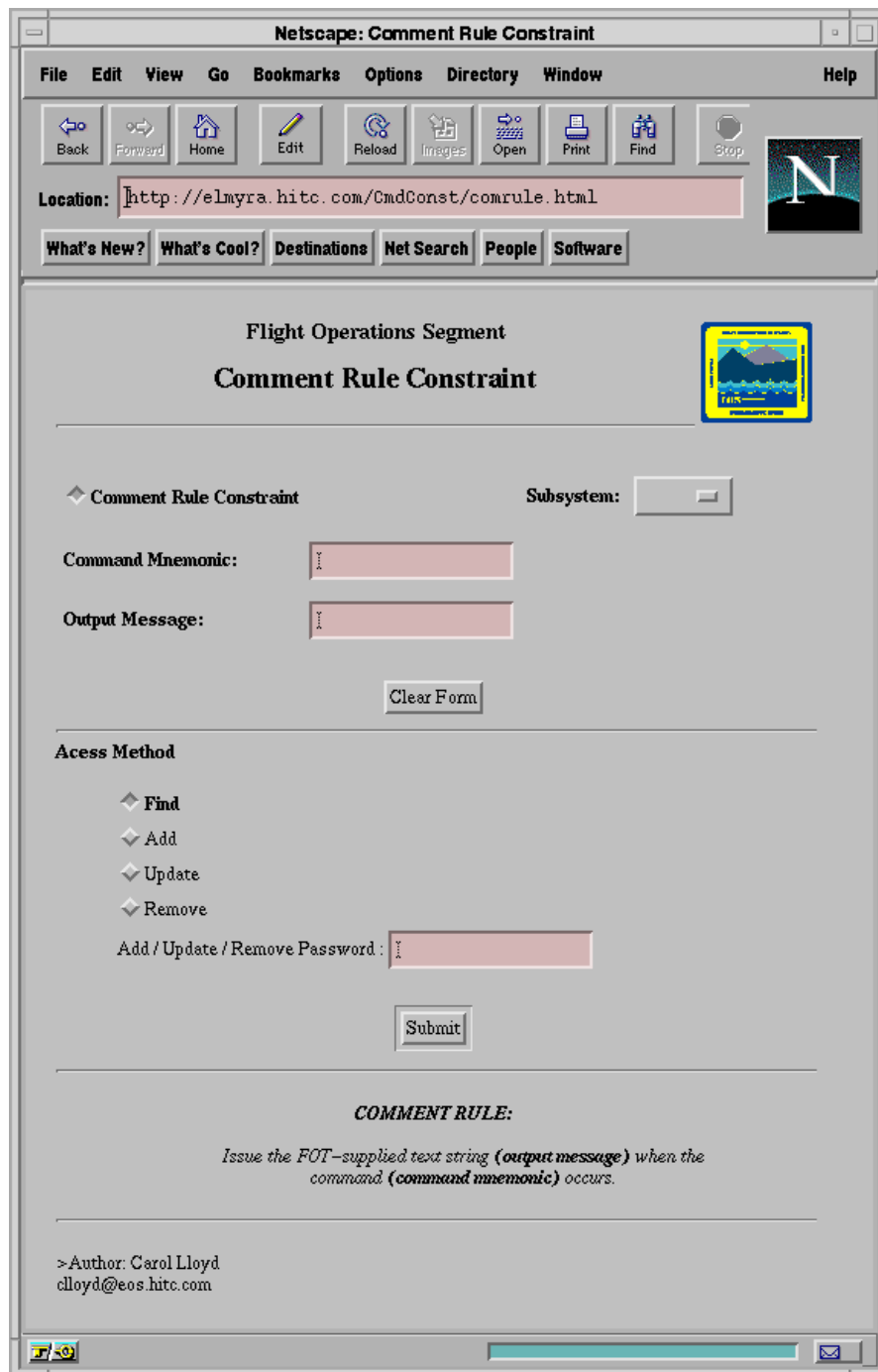
equal to or not equal to the specified bit value. A separate rule must be defined for each trigger command subfield bit being compared. The following is a list of fields associated with the Bit Rule Constraint:

1. **Constraint Identifier.** The number uniquely representing the command constraint. This value is system generated, so a text box is not provided.
2. **Command Mnemonic.** The command parameter with a Bit Rule constraint. This mnemonic must be specified as a valid command parameter in the Command Description PDB.
3. **Subfield Name.** The subfield associated with the command parameter. This value must be specified in the Command Variable Data Word Specification PDB in association with the command parameter.
4. **Bit Location.** The offset of the bit with respect to the start of the command data structure. Valid values are 1 to 528.
5. **Bit Value.** The value of the bit to be compared with. Valid values are 0 to 1.
6. **Relational Operator.** The operator used in conjunction with the bit value to satisfy the constraint, where:  
  
EQ = equal to.  
  
NE = not equal to.
7. **Hard/Soft Flag.** The severity of the constraint, where:  
  
H = hard constraint; indicates this type of constraint would result in an error  
  
S = soft constraint; indicates this type of constraint would result in a warning message

- B. **Comment Rule Constraint.** Open the Comment Rule Constraint page (see Figure 10.4.4.4.2-3) by clicking **Comment Rule Constraint** on the Command Constraints page.

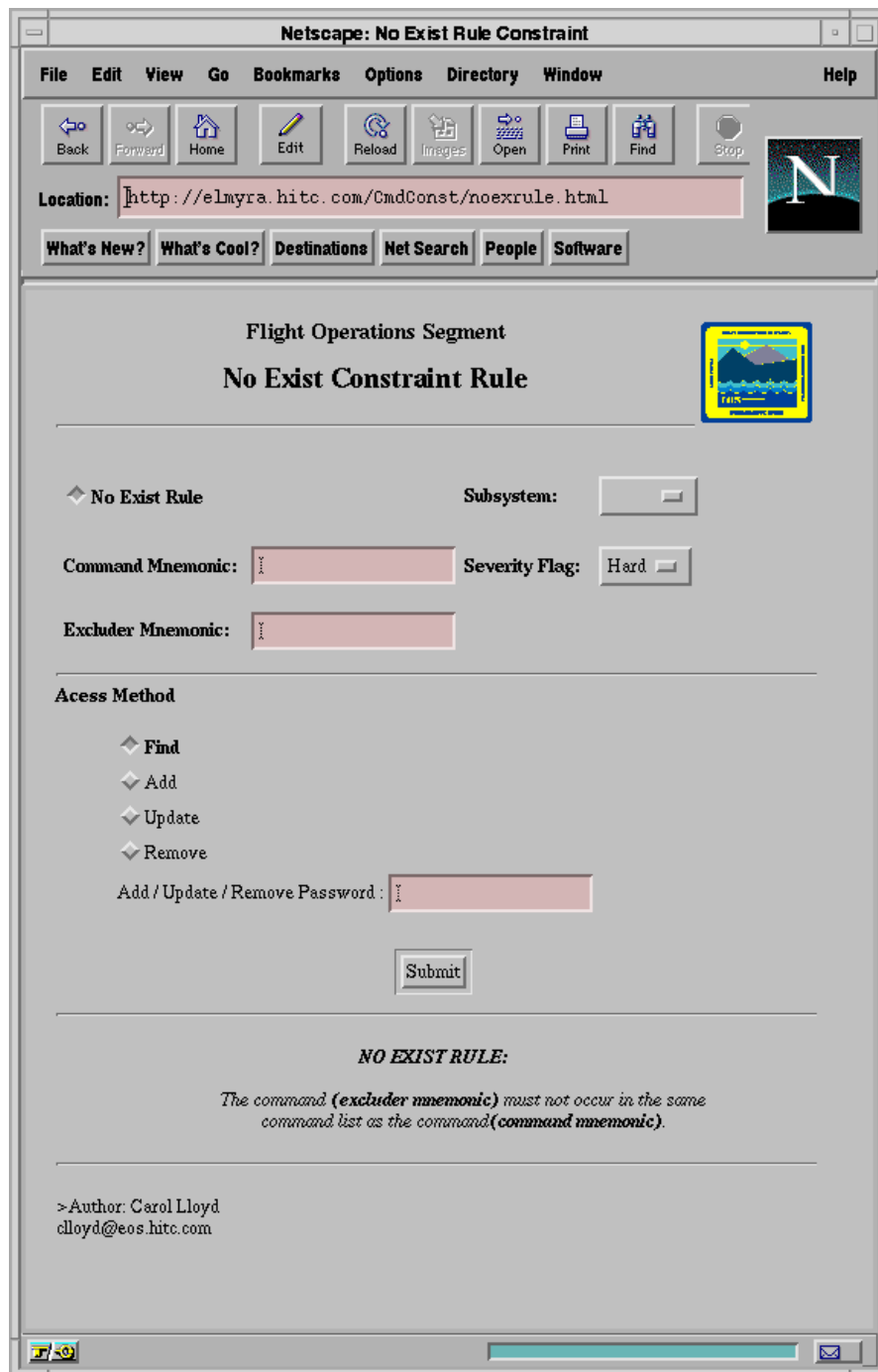
The Comment Rule Constraint Record associates a specific warning message with a command. When the command, referred to as the trigger command is encountered, the defined message is output to the user. The Comment Rule can specify constraint criteria at subfield and subfield bit level for the trigger command, therefore, the constraint ID may also be specified in the Subfield Constraint Definition PDB and/or the Subfield Bit Constraint Definition PDB (refer to section 10.4.4.4.2). The following is a list of fields associated with the Comment Rule Constraint page:

1. **Constraint Identifier.** The number uniquely representing the command constraint. This value is system generated, so a text box is not provided.
2. **Command Mnemonic.** The command parameter with a Comment Rule constraint. This mnemonic must be specified as a valid command parameter in the Command Description PDB.
3. **Output Message.** The text string to be associated with the command parameter.



**Figure 10.4.4.2-3. Comment Rule Constraint Page**

C. **No Exist Rule Constraint.** Open the No Exist Rule Constraint page (see Figure 10.4.4.2-4) by clicking **No Exist Rule Constraint** on the Command Constraints page.



**Figure 10.4.4.4.2-4. No Exist Rule Constraint Page**

The No Exist Rule Constraint Record identifies commands that must not occur in the same command list (i.e., when the trigger command is found in the command list, the excluder command must not appear). The No Exist Rule does not specify constraints at the subfield

or subfield bit level for both the trigger and excluder commands. The following is a list of fields associated with the No Exist Rule constraint:

1. **Constraint Identifier.** The number uniquely representing the command constraint. This value is system-generated, so a text box is not provided.
2. **Trigger Command Mnemonic.** The command parameter with a No Exist Rule constraint. This mnemonic must be specified as a valid command parameter in the Command Description PDB.
3. **Excluder Command Mnemonic.** The command parameter that must not occur when the trigger command exists. This mnemonic must be specified as a valid command parameter in the Command Description PDB.
4. **Hard/Soft Flag.** One ASCII character representing the severity of the constraint, where:

H = hard constraint; indicates this type of constraint would result in an error.

S = soft constraint; indicates this type of constraint would result in a warning message.

- D. **Offset Rule Constraint.** Open the Offset Rule Constraint page (see Figure 10.4.4.4.2-5) by clicking **Offset Rule Constraint** on the Command Constraints page.

The Offset Rule Constraint Record provides the criteria to use when performing one of the four Offset Rules. Offset rules include No Commands After Rule, No Commands Before Rule, Repeat After Rule, and No Remote Terminal (RT) Command Rule. The Offset Rules do not specify constraints at the subfield or subfield bit level for the trigger command. The following is a list of fields associated with the Offset Rule constraint:

1. **Constraint Identifier.** The number uniquely representing the command constraint. This value is system-generated, so a text box is not provided.
2. **Trigger Command Mnemonic.** The command parameter with an Offset Rule constraint. This mnemonic must be specified as a valid command parameter in the Command Description PDB.
3. **Offset Rule Type.** The type offset rule being defined, where:
  - 1 = No Commands Before Rule - when the trigger command occurs, there will be no commanding before for at least the delta time defined.
  - 2 = No Commands After Rule - when the trigger command occurs, there will be no commanding afterwards for at least the delta time defined.
  - 3 = No RT Command Rule - when the trigger command occurs, no commands can be sent to the same RT for at least the delta time defined.
  - 4 = Repeat After Rule - when the trigger command occurs, the trigger command can-not be repeated before the delta time defined

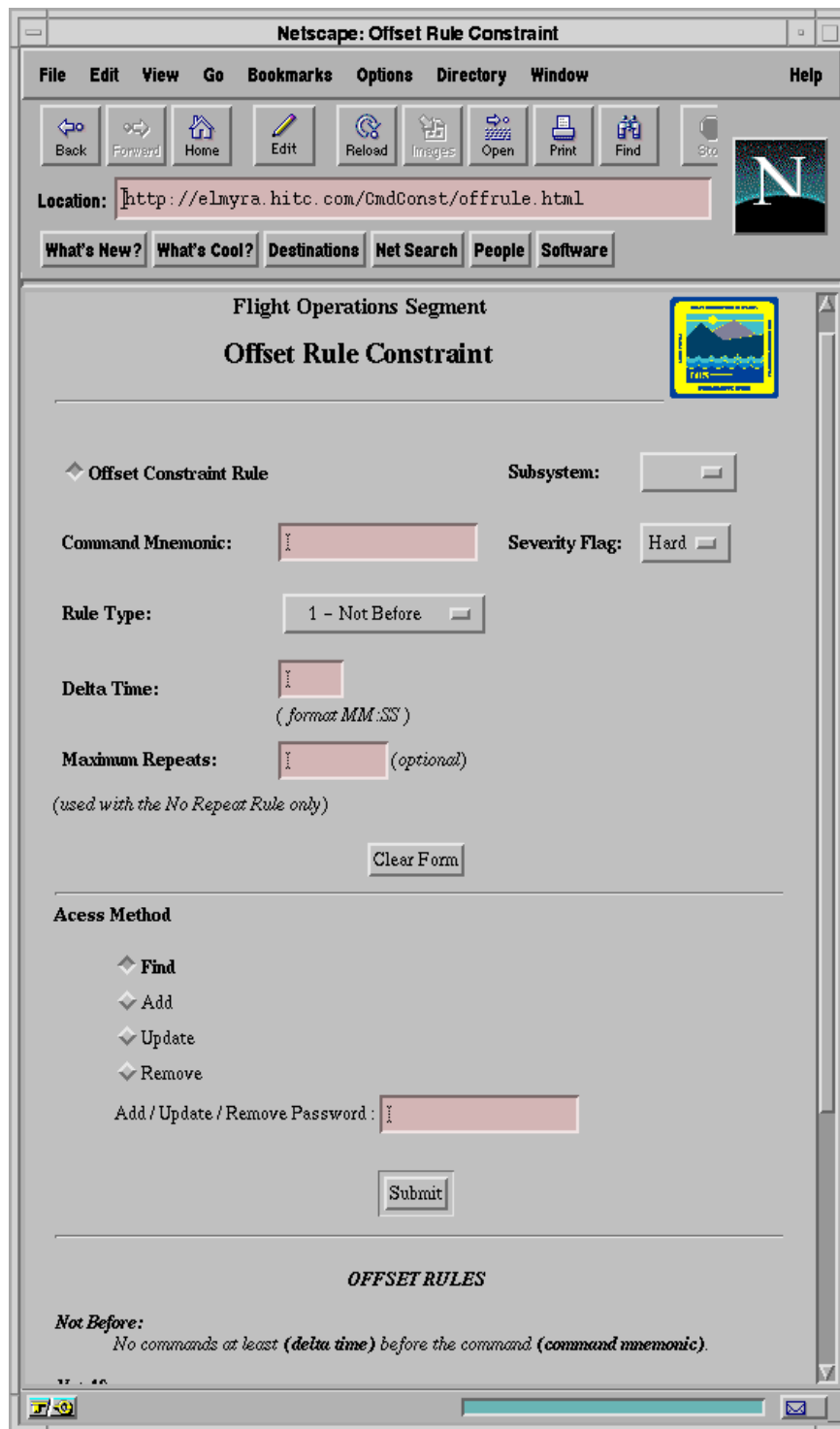


Figure 10.4.4.2-5. Offset Rule Constraint Page

4. **Delta Time.** The time in seconds and milliseconds in which the rule must adhere to. The format for this time value is mm:ss, where:

mm = minutes.

ss = seconds.

5. **Hard/Soft Flag.** The severity of the constraint, where:

H = hard constraint; indicates this type of constraint would result in an error.

S = soft constraint; indicates this type of constraint would result in a warning message.

6. **Maximum Repeats.** The maximum number of repeats allowed with the delta time. This value is only used with the Repeat After Rule. No more than one command per second is allowed.

- E. **Post-rule Constraint.** Open the Post-rule Constraint page (see Figure 10.4.4.4.2-6) by clicking **Post-rule Constraint** on the Command Constraints page.

The Post-rule Constraint Record provides the criteria to use when performing the constraint check ensuring that a satisfier command will occur within a specified time range after the trigger command is issued. The Post-rule can specify constraint criteria at the subfield and/or subfield bit level for the trigger and satisfier commands; therefore, the constraint ID may also be specified in the Subfield Constraint Definition PDB and/or the Subfield Bit Constraint Definition PDB (refer to section 10.4.4.2). The following is a list of fields associated with the Post-rule constraint:

1. **Constraint Identifier.** The number uniquely representing the command constraint. This value is system generated, so a text box is not provided.
2. **Trigger Command Mnemonic.** The command parameter with a Post-rule constraint. This mnemonic must be specified with a valid command parameter in the Command Description PDB.
3. **Satisfier Command Mnemonic.** The command parameter that satisfies the constraint rule. This mnemonic must be specified with a valid command parameter in the Command Description PDB.
4. **Minimum Time.** The minimum time a satisfier command must occur prior to the trigger command. The format for their time value is mm.ss, where:  
  
mm = minutes.  
  
ss = seconds.
5. **Maximum Time.** The maximum time the satisfier command must occur prior to the trigger command. This value must be greater than or equal to the minimum time.
6. **Hard/Soft Flag.** The severity of the constraint, where:  
  
H = hard constraint; indicates this type of constraint would result in an error.

S = soft constraint; indicates this type of constraint would result in a warning message.

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**Flight Operations Segment**

**Post Rule Constraint**

---

◆ **Post Rule Constraint** Subsystem:

Trigger Command:  Severity Flag:

Satisfier Command:

Minimum Time:  Maximum Time:   
(format MM:SS) (format MM:SS)

---

**Access Method**

◆ Find  
◆ Add  
◆ Update  
◆ Remove

Add / Update / Remove Password:

---

**Post Rule:**

*The satisfier command must occur at least (minimum time) later and at most (maximum time) later than the (trigger command).*

**Figure 10.4.4.2-6. Post-Rule Constraint Page**



F. **Pre-rule Constraint.** Open the Pre-rule Constraint page (see Figure 10.4.4.4.2-7) by clicking **Pre-rule Constraint** on the Command Constraints page.

Netscape: Pre Rule Constraint

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Flight Operations Segment

Pre Rule Constraint

◆ Pre Rule Constraint Subsystem:

Trigger Command:  Severity Flag:

Satisfier Command:

Minimum Time:  Maximum Time:   
(format MM:SS) (format MM:SS)

Excluder Command:   
(optional)

Clear Form

Access Method

◆ Find  
◆ Add  
◆ Update  
◆ Remove

Add / Update / Remove Password:

Submit

Pre Rule:

The command (**satisfier command**) must occur at least (**minimum time**) earlier and at most (**maximum time**) earlier than the command (**trigger command**). The optional command (**excluder**

Figure 10.4.4.4.2-7. Pre-Rule Constraint Page

The Pre-rule Constraint Record provides the criteria to use when performing the constraint check ensuring a command, referred to as the satisfier, occurs prior to the trigger command within a specified time range. Additionally, another command, known as the excluder, may be defined not to occur between the satisfier and trigger commands in the same constraint rule. The Pre-rule can specify constraint criteria at the subfield and/or subfield bit level for the trigger, satisfier and excluder commands; therefore, the constraint ID may also be specified in the Subfield Constraint Definition PDB and/or the Subfield Bit Constraint Definition PDB (refer to sections 10.4.4.4.2). The following is a list of fields associated with the Pre-rule Definition Record:

1. **Constraint Identifier.** The number uniquely representing the command constraint. This value is system generated, so a text box is not provided.
2. **Trigger Command Mnemonic.** The command parameter with a Pre-rule constraint. This mnemonic must be specified with a valid command parameter in the Command Description PDB.
3. **Satisfier Command Mnemonic.** The command parameter satisfying the Constraint rule. This mnemonic must be specified with a valid command parameter in the Command Description PDB.
4. **Minimum Time.** The minimum time a satisfier command must occur prior to the trigger command. The format for their time value is mm:ss, where:  
  
mm = minutes.  
  
ss = seconds.
5. **Maximum Time.** The maximum time the satisfier command must occur prior to the trigger command. This value must be greater than or equal to the minimum time.
6. **Excluder Command Mnemonic.** The command parameter that must not occur between the trigger and satisfier commands. This mnemonic must be specified with a valid command parameter in the Command Description PDB.
7. **Hard/Soft Flag.** One ASCII character representing the severity of the constraint, where:  
  
H = hard constraint; indicates this type of constraint would result in an error.  
  
S = soft constraint; indicates this type of constraint would result in a warning message.

- G. **Scalar Rule Constraint.** Open the Scalar Rule Constraint page (see Figure 10.4.4.4.2-8) by clicking **Scalar Rule Constraint** on the Command Constraints page.

The Scalar Rule Constraint Record provides criteria to use when performing the constraint check ensuring the value of the trigger command's subfield satisfies the specified data value in association with its relational operator. A separate rule must be defined for each trigger command subfield to be compared. The following is a list of fields associated with the Scalar Rule Definition Record:

1. **Constraint Identifier.** The number uniquely representing the Command constraint. This value is system generated.
2. **Trigger Command Mnemonic.** The command parameter with a Scalar Rule constraint. This mnemonic must be specified as a valid command parameter in the Command Description PDB.

Netscape: Scalar Rule Constraint

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Scalar Rule Constraint

◆ Scalar Rule Constraint Subsystem:

Command Mnemonic:  Severity Flag:

Subfield Name:

Data Value:  Relational Operator:

Clear Form

Access Method

◆ Find  
◆ Add  
◆ Update  
◆ Remove

Add / Update / Remove Password:

Submit

Scalar Rule:  
*The value of subfield (**subfield name**) for the command (**command mnemonic**) must be (**relational operator**) to (**data value**).*

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**Figure 10.4.4.2-8. Scalar Rule Constraint Page**

3. **Subfield Name.** The subfield associated with the command parameter. This name must be specified in the Command Variable Data Word Specification PDB in association with its command parameter.

4. **Scalar Data Value.** The criteria for verifying the constraint.

5. **Relational Operator.** Indicates how the value of the subfield is compared with the scalar data value, where:

LT = less than.

LE = less than or equal to.

GT = greater than.

GE = greater than or equal to.

EQ = equal to.

NE - not equal to.

6. **Hard/Soft Flag.** The severity of the constraint, where:

H = hard constraint; indicates this type of constraint would result in an error.

S = soft constraint, indicates this type of constraint would result in a warning message

H. **Subfield Constraint.** Open the Subfield Constraint page (see Figure 10.4.4.4.2-9) by clicking **Subfield Constraint** on the Command Constraints page.

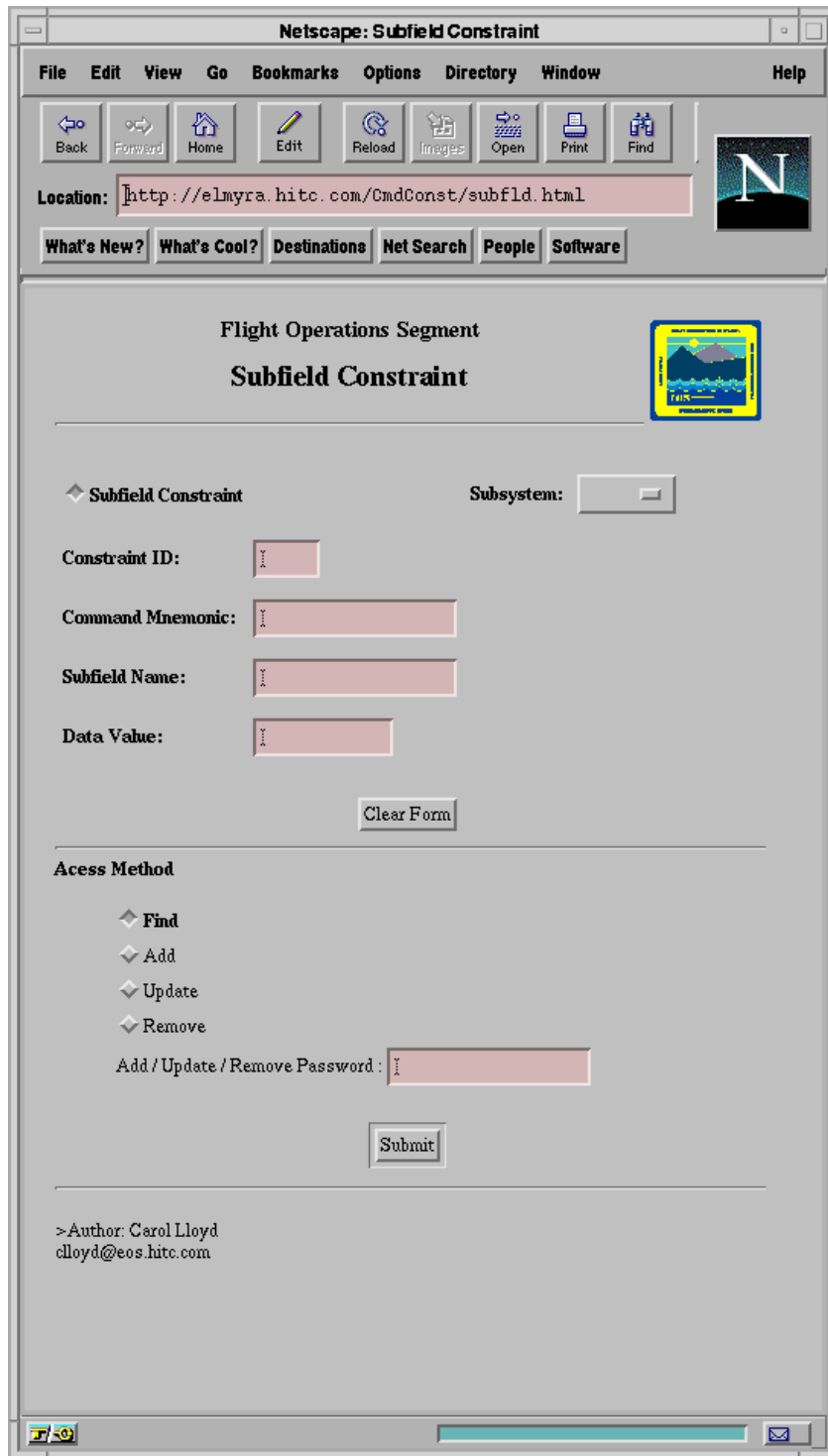
The Subfield Constraint Definition Record provides criteria for the command subfield in association with their Constraint rule. Triggers, satisfiers, and excluder may have subfield criteria defined in a Constraint rule. The following is a list of fields associated with the Subfield constraint:

1. **Constraint Identifier.** The number uniquely representing the Command constraint. This value must also be defined in the Comment Rule Definition PDB, the Pre-rule Definition PDB, or the Post-rule Definition PDB.

2. **Command Mnemonic.** The command parameter associated with the Constraint rule. This mnemonic must be defined in the Comment Rule Definition PDB, the Pre-rule Definition PDB or the Post-rule Definition PDB as a trigger, excluder, or satisfier command.

3. **Subfield Name.** The subfield associated with the command parameter for the Constraint rule. This value must be specified in the Command Variable Data Word Specification PDB in association with the command mnemonic.

4. **Data Value.** The value of the subfield to be compared in the constraint check.



**Figure 10.4.4.4.2-9. Subfield Constraint Page**

- I. **Subfield Bit Constraint.** Open the Subfield Bit Rule Constraint page (see Figure 10.4.4.4.2-10) by clicking **Subfield Bit Constraint** on the Command Constraints page.

Netscape: Subfield Bit Constraint

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Location: <http://elmyra.hitc.com/CmdConst/subfldbit.html>

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Subfield Bit Constraint

◆ Subfield Bit Constraint Subsystem:

Constraint ID:

Command Mnemonic:

Subfield Name:

Bit Location:

Bit Value:

Clear Form

Access Method

◆ Find  
◆ Add  
◆ Update  
◆ Remove

Add / Update / Remove Password:

Submit

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**Figure 10.4.4.4.2-10. Subfield Bit Rule Constraint Page**

The Subfield Bit Constraint Record provides criteria for command subfield bits in association with the Constraint rule. The Comment Rule Definition PDB, the Pre-rule Definition PDB or the Post-rule Definition PDB may specify constraint criteria at the command subfield bit level. The following is a list of fields associated with the Subfield Bit constraint.

1. **Constraint Identifier.** The number uniquely representing the Command constraint. This value must be specified in the Comment Rule Definition PDB, the Pre-rule Definition PDB or the Post-rule Definition PDB.
2. **Command Mnemonic.** The command parameter associated with the Constraint rule. This mnemonic must be defined in the Comment Rule Definition PDB, the Pre-rule Definition PDB, or the Post-rule Definition PDB, as a trigger, excluder, or satisfier command.
3. **Subfield Name.** The subfield associated with the command parameter (field 2) for the Constraint rule. This value must be specified in the Command Variable Data Word Specification PDB.
4. **Bit Location.** The offset of the bit from the start of the command data structure. Valid values are 1 to 528.
5. **Bit Value.** The value of the bit to be compared with. Valid values are 0 to 1.

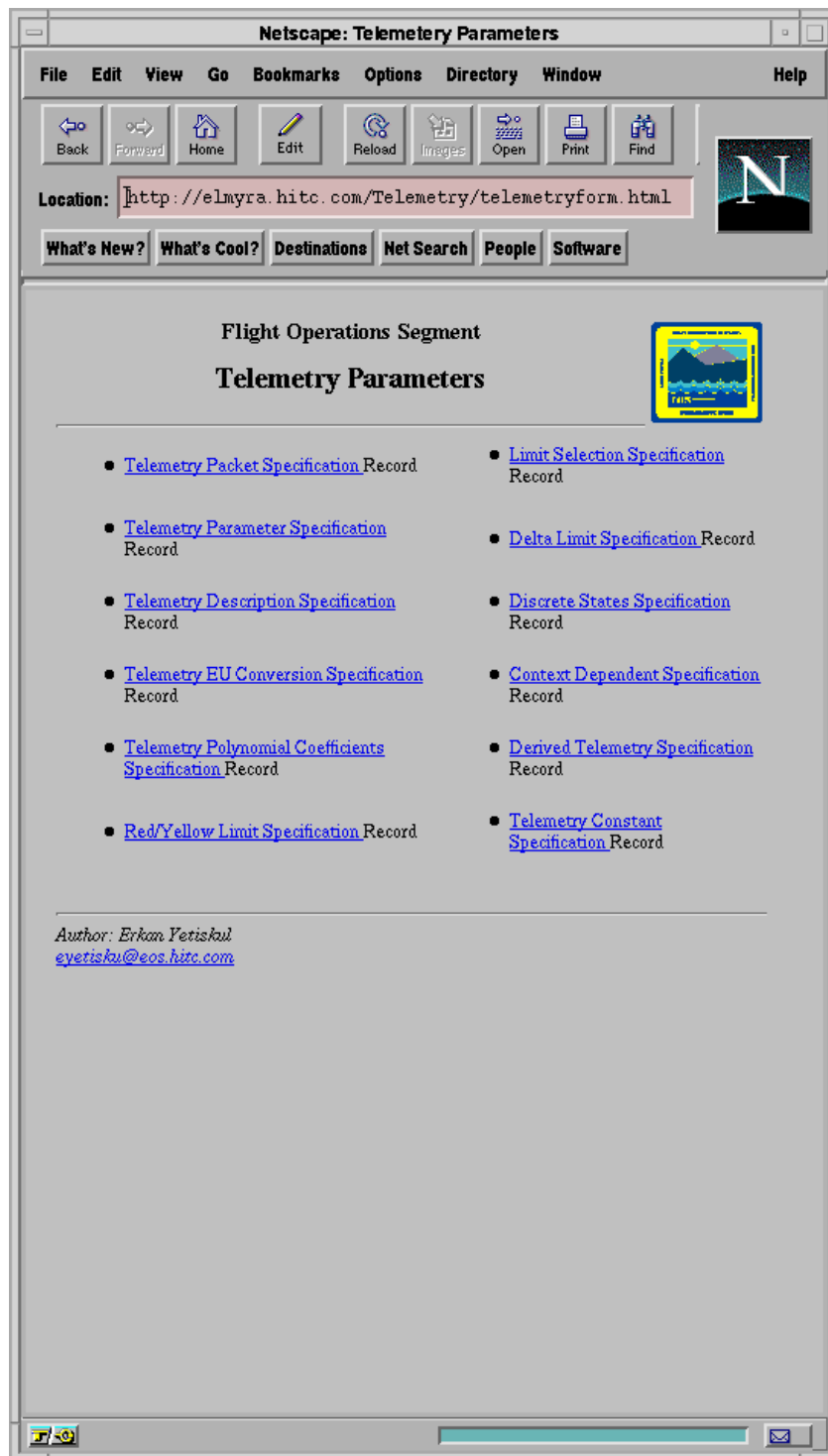
#### 10.4.4.4.3 Telemetry Parameters

Open the Telemetry Parameters Record page (see Figure 10.4.4.4.3-1) by clicking **Telemetry Parameters** on the PDB Parameters page.

- A. **Telemetry Packet Specification.** Open the Telemetry Packet Specification Record page (see Figure 10.4.4.4.3-2) by clicking **Telemetry Packet Specification** on the Telemetry Parameters page.

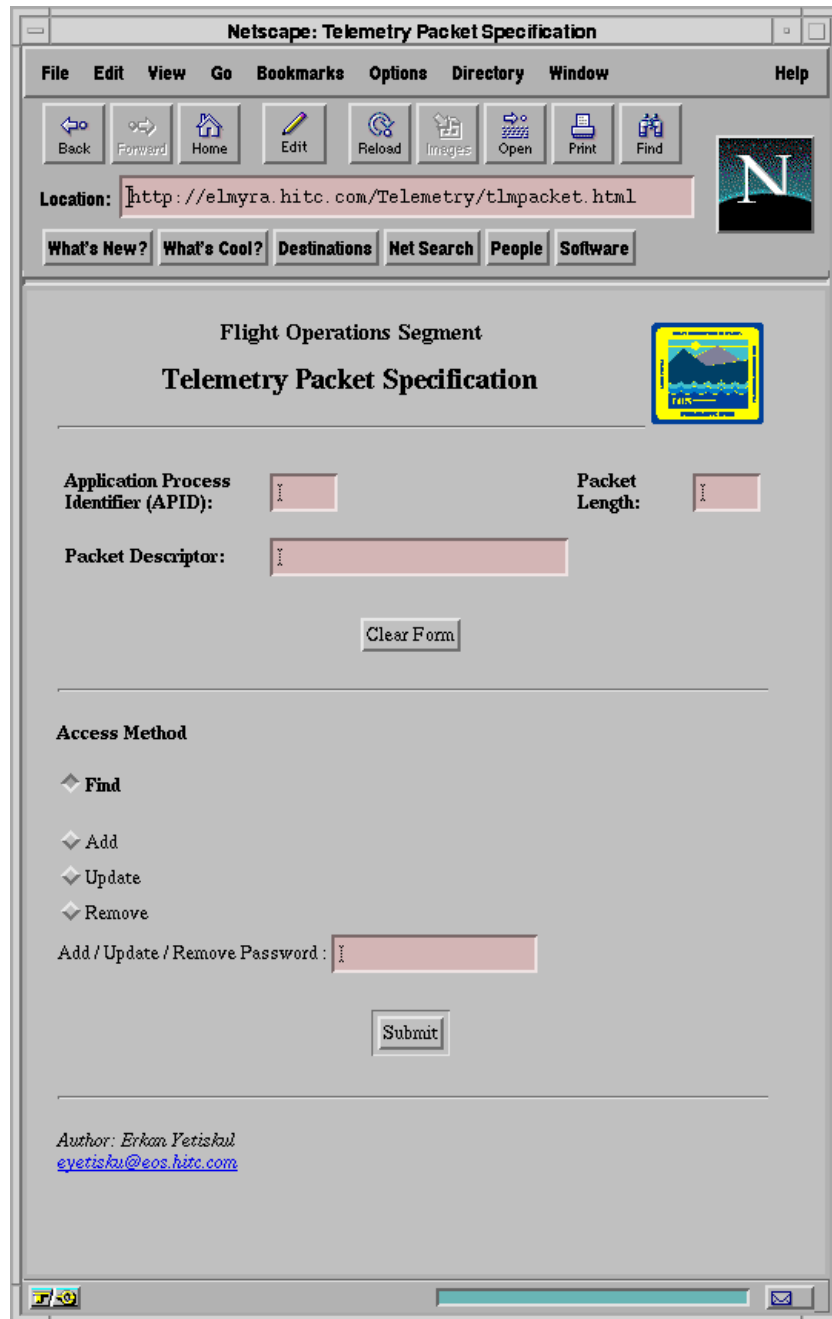
The Telemetry Packet Specification Record defines valid CCSDS packets for processing by the FOS. The telemetry processing functions will use this information to extract CCSDS standard source data packets from the telemetry EOS Data Operations System (EDOS) Data Units (EDUs).

1. **Application Process Identifier (APID).** The number uniquely identifying the type of packet from the S-band downlink to be decommutated by the FOS for the EOS spacecraft. Valid values are 0 to 2047.
2. **Packet Length.** The expected length in bytes of the telemetry packet including the primary header, secondary header, and application data field. Valid values are 1 to 1664.
3. **Packet Descriptor.** The textual information describing the telemetry packet.



**Figure 10.4.4.4.3-1. Telemetry Parameters Page**





**Figure 10.4.4.4.3-2. Telemetry Packet Specification Page**

- B. **Telemetry Parameter Specification Record.** Open the Telemetry Parameter Specification Record page (see Figure 10.4.4.4.3-3) by clicking **Telemetry Parameter Specification** on the Telemetry Parameters page.

The Telemetry Parameter Specification Record identifies analog and discrete telemetry parameters supporting the EOS spacecraft. Each record contains location information used

to decommutate the downlink telemetry streams. A telemetry parameter is uniquely identified by the application process identifier, telemetry identifier, telemetry mnemonic, major cycle ID, and the telemetry instance.

1. **Application Process ID.** The type of packet from the S-band downlink to be decommutated by the FOS. This value must also be defined in the Telemetry Packet Specification PDB. Valid values are 0 to 2047.
2. **Telemetry Parameter ID.** The number uniquely representing the telemetry parameter. This value must also be defined in the Telemetry Description PDB.
3. **Telemetry Mnemonic.** The parameter supporting telemetry processing for the EOS spacecraft. The telemetry mnemonic is a unique name consisting of 7 to 20 characters representing a telemetry point.

AAA\_BC\_D...D

where:

AAA represents the spacecraft subsystem or instruments.

B represents the telemetry sample type.

C represents the telemetry point source type.

D represents 1 to 13 uppercase characters describing the telemetry point function.

4. **Major Cycle ID.** The number uniquely identifying the major cycle number within a master cycle for the individual packet.
5. **Telemetry Instance.** The occurrence of the telemetry parameter within the packet. This value is used to indicate those telemetry points that occur more than once in the downlink packet (supercommutated). This value does not indicate the order in which the telemetry point occurs.
6. **Packet Offset.** The bit offset within the packet where the most significant bit of a telemetry value is located. This value reflects the offset from the start of the application data.
7. **Component Size:** The total number of components for the parameter. The default value equals 1. Valid values are 1 to 8.
8. **Component Number.** The number of the composite.
9. **Size In Bits.** The number of bits in the data stream used to define the telemetry value. This value reflects the size for each component. Valid values are 1 to 64.
10. **Delta Time.** The time in milliseconds that must be added/subtracted to the spacecraft packet time stamp for each telemetry point to ensure accuracy of spacecraft events.
11. **Parameter Data Representation.** The data type. Valid data types include:  
UI = unsigned word integer (1-32 bits).

SI = two's complement signed word integer (1-32 bits).

FI = single precision floating point in MIL-STD-1750A format (32/48 bits).

Netscape: Telemetry Parameter Specification

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Telemetry Parameter Specification

Application Process ID:

Telemetry Parameter ID:

Telemetry Mnemonic:

Major cycle ID:

Telemetry Instance:

Packet Offset:

Component Size:

Component Number:

Size In Bits:

Delta Time:

Parameter Data Representation:

Clear Form

Access Method

☐ Find

☐ Add

☐ Update

☐ Remove

Add / Update / Remove Password:

Submit

**Figure 10.4.4.4.3-3. Telemetry Parameter Specification Page**

- C. **Telemetry Description Specification Record.** Open the Telemetry Description Specification Record page (see Figure 10.4.4.4.3-4) by clicking **Telemetry Description Specification** on the Telemetry Parameters page.

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**Telemetry Description Specification**

Telemetry Parameter ID:  Telemetry Mnemonic:

Major Assembly Name:  Component Name:

Subassembly Name:  Remote Terminal ID Name:

Telemetry Type:  Parameter Type:

SCC Requirement Flag:  Telemetry Description:

Clear Form

**Access Method**

☐ Find

☐ Add

☐ Update

☐ Remove

Add / Update / Remove Password:

Submit

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**Figure 10.4.4.4.3-4. Telemetry Description Specification Page**

The Telemetry Description Record provides descriptive information concerning a telemetry parameter.

1. **Telemetry Parameter ID.** The number uniquely representing the telemetry parameter. This value must also be defined in the Telemetry Parameter Specification PDB or the Derived Telemetry Specification PDB.
2. **Telemetry Mnemonic.** The name of the telemetry parameter.
3. **Major Assembly Name.** The source of the telemetry point.
4. **Component Name.** The name of the end spacecraft component that is the source of the telemetry point.
5. **Subassembly Name.** The name of the subassembly within the component containing the telemetry circuit.
6. **Remote Terminal ID Name.** The name of the remote terminal on the C&T Bus that will transfer the sample telemetry to the CTIU.
7. **Telemetry Type.** The classification of the telemetry point with respect to the spacecraft remote terminal and end component interface.
8. **Parameter Type.** The type of parameter, where:  
A = ANALOG.  
D = DISCRETE.
9. **SSC Requirement Flag.** The telemetry points that use the spacecraft controls computer for processing, where:  
N = not required by the SCC.  
R = required by the SCC.

10. **Telemetry Description.** The textual information describing a telemetry point.

- D. **Telemetry EU Conversion Specification Record.** Open the Telemetry EU Conversion Specification Record page (see Figure 10.4.4.4.3-5) by clicking **Telemetry EU Conversion Specification** on the Telemetry Parameters page.

The Telemetry EU Conversion Specification Record provides the necessary information for the conversion of a raw analog telemetry Data Number (DN) to an Engineering Unit (EU) such as amps or volts. The calibration scaling factor is used to allow very large or small numbers to be defined by a telemetry point. The scaling factor will be applied to each equation using the following format:  $EU = (1/2 \times \text{scale factor}) \times (\text{Calibration Equation})$  during the process of preparing the definitions for operational use. Additionally, information for conversion selection may be specified with a switch mnemonic and its minimum/maximum values. Each analog parameter may specify up to four different EU conversion equations. The segment number refer to the number of the segment. This value is set to 1 for unsegmented conversion types.

Netscape: Telemetry EU Conversion Specification Record

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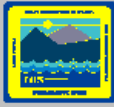
Location:

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Flight Operations Segment

**Telemetry EU Conversion Specification Record**



Telemetry Parameter ID:	<input type="text"/>	Telemetry Mnemonic:	<input type="text"/>
Conversion Type:	<input type="text"/>	Conversion Group Number:	<input type="text"/>
Calibration Scaling Factor:	<input type="text"/>	Data Units:	<input type="text"/>
Conversion Switch Mnemonic:	<input type="text"/>	Minimum Value:	<input type="text"/>
Maximum Value:	<input type="text"/>	Segment Number:	<input type="text"/>

---

**Access Method**

☒ Find  
☐ Add  
☐ Update  
☐ Remove

Add / Update / Remove Password:

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**Figure 10.4.4.3-5. Telemetry EU Conversion Specification Page**

1. **Telemetry Parameter ID.** The number uniquely representing the telemetry parameter. This value must also be defined in the Telemetry Description PDB and of the parameter type analog.

2. **Telemetry Mnemonic.** The name of the telemetry parameter. This name must also be defined in the Telemetry Description PDB in combination with its telemetry parameter ID.

3. **Conversion Type.** The type of calibration conversion to be performed on the telemetry point. Valid values include:

$$U\_2D = \text{unsegmented\_2D EU} = C0 + C1X + C2X^{**2}$$

$$U\_3D = \text{unsegmented\_3D EU} = C0 + C1X + C2X^{**2} + C3X^{**3}$$

$$U\_4D = \text{unsegmented\_4D EU} = C0 + C1X + C2X^{**2} + C3X^{**3} + C4X^{**4}$$

$$U\_5D = \text{unsegmented\_5D EU} = C0 + C1X + C2X^{**2} + C3X^{**3} + C4X^{**4} + C5X^{**5}$$

$$U\_6D = \text{unsegmented\_6D EU} = C0 + C1X + C2X^{**2} + C3X^{**3} + C4X^{**4} + C5X^{**5} + C6X^{**6}$$

$$U\_7D = \text{unsegmented\_7D EU} = C0 + C1X + C2X^{**2} + C3X^{**3} + C4X^{**4} + C5X^{**5} + C6X^{**6} + C7X^{**7}$$

$$U\_EXP = \text{unsegmented\_EXP EU} = C0 + C1e^{**}(C2X)$$

LINE = line segment

e - represents the natural constant (2.71828182846)

4. **Conversion Group Number.** The set of polynomial or linear coefficients to be used in the conversion equation. This number must also be defined in the Polynomial Coefficients Specification PDB or the Linear Coefficient Specification. PDB as indicated by the conversion type.
5. **Calibration Scaling Factor.** Defines the power of 2 by which the calibration equation is divided:  $EU = (1/2^{**SF}) * (\text{Calibration Equation})$ . A default value of zero indicates scaling is not performed on the telemetry point.
6. **Data Units.** The abbreviation for the engineering units to which a raw telemetry data number is converted.
7. **Conversion Switch Mnemonic.** The telemetry parameter whose value determines the equation to use when performing EU conversion. This name must be defined in the Telemetry Description PDB.
8. **Minimum Value.** The lower limit, inclusive, of the range of values of the conversion switch mnemonic for which the parameter will use the associated conversion equation. This value must be less than or equal to the maximum switch value.
9. **Maximum Value.** The upper limit, inclusive, of the range of values of the conversion switch mnemonic for which the parameter will use the associated conversion equation. This value must be greater than or equal to the minimum switch value.

**10.Segment Number.** The number of the segment. This value is set to 1 for unsegmented conversion types.

- E. **Telemetry Polynomial Coefficients Specification Record.** Open the Telemetry Polynomial Coefficients Specification Record page (see Figure 10.4.4.3-6) by clicking **Telemetry Polynomial Coefficients Specification** on the Telemetry Parameters page.



**Netscape: Telemetry Polynomial Coefficients Specification Record**

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**Flight Operations Segment**

**Telemetry Polynomial Coefficients Specification Record**

Conversion Group Number:  Conversion Group Name:

Coefficient #0:  Coefficient #4:

Coefficient #1:  Coefficient #5:

Coefficient #2:  Coefficient #6:

Coefficient #3:  Coefficient #7:

**Access Method**

☒ Find

☐ Add

☐ Update

☐ Remove

Add / Update / Remove Password:

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**Figure 10.4.4.4.3-6. Telemetry Polynomial Coefficients Specification Page**

The Polynomial Coefficients Specification Record defines the coefficients used to convert raw telemetry values into EUs using a polynomial equation. Each conversion equation is identified by a conversion group number and name. Multiple telemetry parameters may

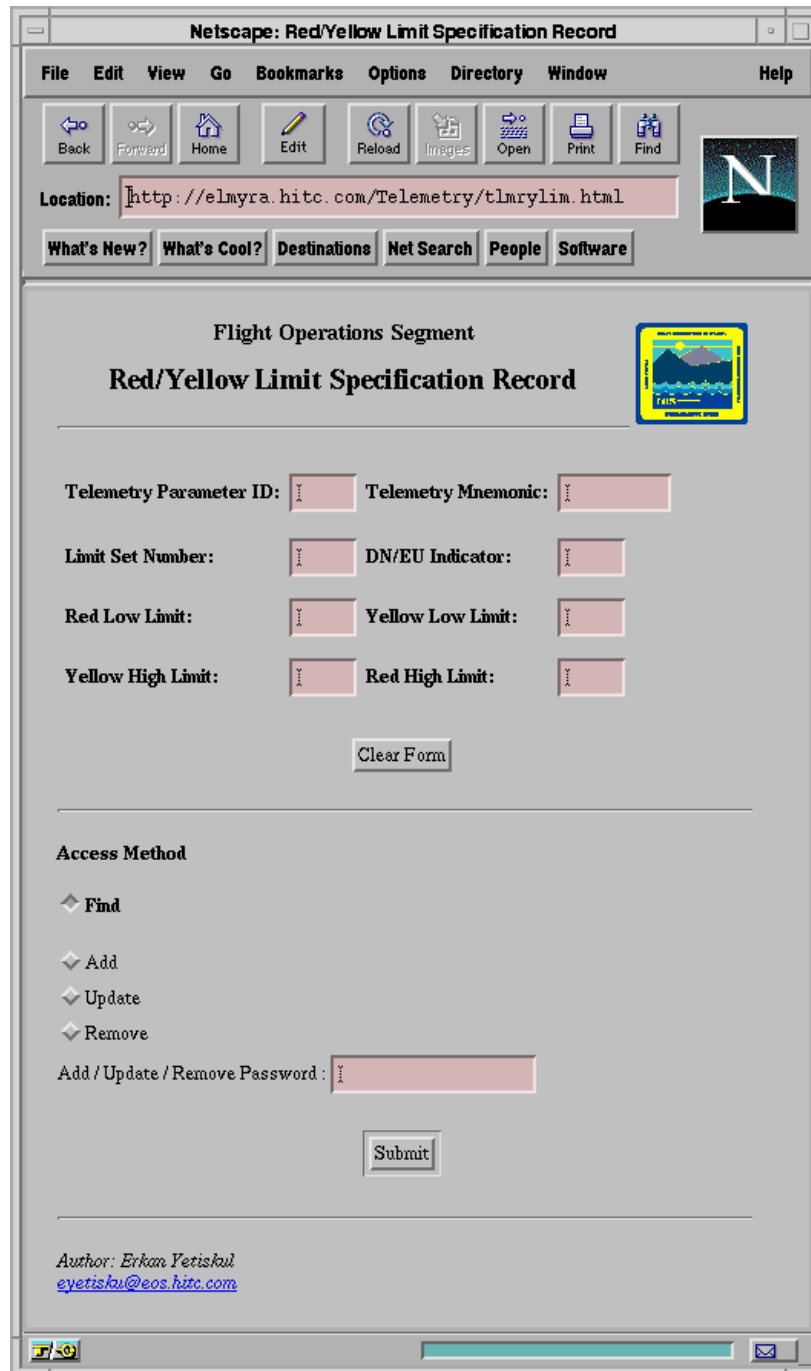
access the same conversion equation by its group number. Equations up to the seventh order may be stored for any one group, with the number of valid coefficients dependent on the type of conversion.

1. **Conversion Group Number.** The number uniquely identifying a set of coefficients associated with a conversion equation.
2. **Conversion Group Name.** The set of coefficients by name.
3. **Coefficient #0.** The value of the constant in the equation.
4. **Coefficient #1.** The value of the coefficient for the first order in the equation.
5. **Coefficient #2.** The value of the coefficient for the second order in the equation.
6. **Coefficient #3.** The value of the coefficient for the third order in the equation.
7. **Coefficient #4.** The value of the coefficient for the fourth order in the equation.
8. **Coefficient #5.** The value of the coefficient for the fifth order in the equation.
9. **Coefficient #6.** The value of the coefficient for the sixth order in the equation.
10. **Coefficient #7.** The value of the coefficient for the seventh order in the equation.

F. **Red/Yellow Limit Specification Record.** Open the Red/Yellow Limit Specification Record page (see Figure 10.4.4.4.3-7) by clicking **Red/Yellow Limit Specification** on the Telemetry Parameters page.

The Red/Yellow Limit Specification Record defines the red/yellow - high/low limit checking criteria associated with an analog, discrete, or derived telemetry parameter. A yellow out-of-limits condition indicates the component is no longer healthy and action should be taken to prevent a hazardous situation. A red out-of-limits condition indicates the component is in imminent danger of suffering damage and immediate action is required. Each parameter may specify up to four limit sets defining these conditions.

1. **Telemetry Parameter ID.** The number uniquely representing the telemetry parameter. This value must also be defined in the Telemetry Description Specification PDB.
2. **Telemetry Mnemonic.** The name of the telemetry parameter. This name must also be defined in the Telemetry Description Specification PDB in combination with its telemetry parameter ID.
3. **Limit Set Number.** The set of limits associated with the telemetry parameter. Each parameter may define up to 4 limit sets. Set numbers must be used in order beginning with number 1 (i.e., limit set 3 cannot be defined unless limit set 2 has been defined). Valid values are 1 to 4.



**Figure 10.4.4.4.3-7. Red/Yellow Limit Specification Page**

4. **DN/EU Indicator.** The units a limit value is defined as (i.e., raw data number or engineering units), where:

DN = raw data number

EU = engineering units

This field is only used for analog telemetry parameters, therefore the telemetry parameter must be of the parameter type analog. Additionally, a parameter with its limit set expressed in EUs must also specify a conversion type in its associated Telemetry EU Conversion Specification PDB. All limit sets for a particular parameter must be defined as DN or EU, but not a combination of both.

5. **Red Low Limit.** The low dangerous limit value for the telemetry parameter. The format for this field is determined by the DN/EU indicator. A DN/EU indicator set to DN indicates this value will be defined as a raw data number and contains a decimal integer. A DN/EU indicator set to EUs indicates this value will be defined in EUs and contains a floating-point number. This value must be less than the yellow low limit.
6. **Yellow Low Limit.** The low warning limit value for the telemetry parameter. The format for this field is determined by the DN/EU indicator. A DN/EU indicator set to DN indicates this value will be defined as a raw data number and contains a decimal integer. A DN/EU indicator set to EU indicates this value will be defined in EUs and contains a floating-point number. This value must be greater than the red low limit and less than the yellow high limit.
7. **Yellow High Limit.** The high warning limit value for the telemetry parameter. The format for this field is determined by the DN/EU indicator. A DN/EU indicator set to DN indicates this value will be defined as a raw data number and contains a decimal integer. A DN/EU indicator set to EU indicates this value will be defined in EUs and contains a floating-point number. This value must be greater than the yellow low limit and less than the red high limit.
8. **Red High Limit.** This is the high dangerous limit value for the telemetry parameter. The format for this field is determined by the DN/EU indicator. A DN/EU indicator set to DN indicates this value will be defined as a raw data number and contains a decimal integer. A DN/EU indicator set to EU indicates this value will be defined in EUs and contains a floating-point number. This value must be greater than the yellow high limit.

G. **Limit Selection Specification Record.** Open the Limit Selection Specification Record page (see Figure 10.4.4.4.3-8) by clicking **Limit Selection Specification** on the Telemetry Parameters page.

The Limit Selection Specification Record defines the criteria for selecting a limit set for a telemetry parameter. The value of the parameter defined by the limit switch mnemonic will indicate the limit set to use. Each parameter may define up to four limit sets.

1. **Telemetry ID.** The number uniquely representing the telemetry parameter. This value must also be defined in the Red/Yellow Limit Specification PDB.
2. **Telemetry Mnemonic.** The name of the telemetry parameter. This name must also be defined in the Red/Yellow Limit Specification PDB in combination with its telemetry parameter ID.

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**Limit Selection Specification Record**

Telemetry Parameter ID:  Telemetry Mnemonic:

Limit Set Number:  Limit Switch Mnemonic:

Minimum Switch Value:  Maximum Switch Value:

---

**Access Method**

☒ Find

☐ Add

☐ Update

☐ Remove

Add / Update / Remove Password:

---

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**Figure 10.4.4.3-8. Limit Selection Specification Page**

3. **Limit Set Number.** The limit set associated with the telemetry parameter. Each parameter may define up to 4 limit sets. Set numbers must be used in order beginning with number 1 (i.e., limit set 3 cannot be defined unless limit set 2 has been defined).

This number must also be defined in the Red/Yellow Limit Specification PDB in association with its telemetry parameter ID and mnemonic. Valid values are 1 to 4.

4. **Limit Switch Mnemonic.** The telemetry parameter whose value determines the limit set to use when performing limit checking. This name must be defined in the Telemetry Description PDB.
5. **Minimum Switch Value.** The lower limit, inclusive, of the range of values of the limit switch mnemonic for which the parameter will be limit checked. This value must be less than or equal to the maximum switch value.
6. **Maximum Switch Value.** The upper limit, inclusive, of the range of values of the limit switch mnemonic for which the parameter will be limit checked. This value must be greater than or equal to the minimum switch value.

H. **Delta Limit Specification Record.** Open the Delta Limit Selection Specification Record page (see Figure 10.4.4.4.3-9) by clicking **Delta Limit Specification** on the Telemetry Parameters page.

The Delta Limit Specification Record defines delta limit checking criteria associated with a telemetry parameter. Delta limits refers to the maximum difference between two consecutive samples that is considered normal. Each telemetry parameter may define one delta limit.

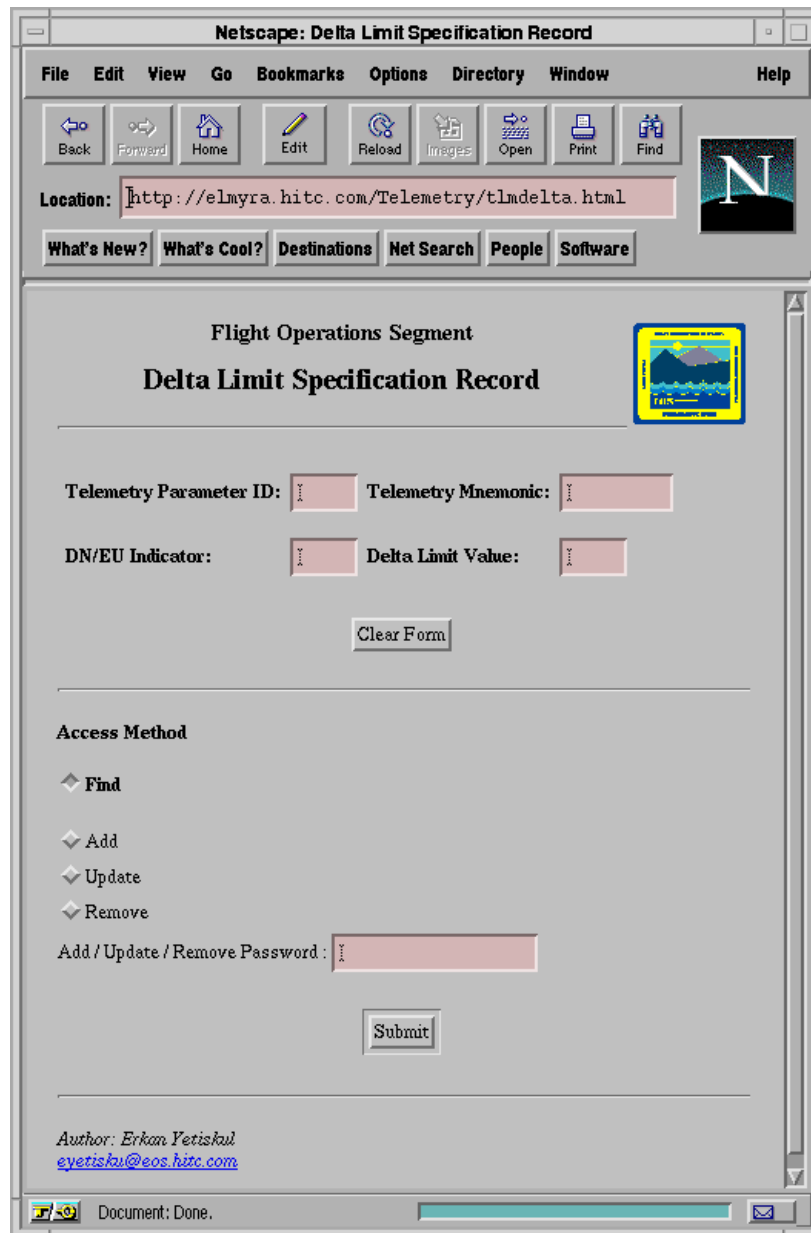
1. **Telemetry Parameter ID.** The telemetry parameter. This value must also be defined in the Telemetry Description Specification PDB.
2. **Telemetry Mnemonic.** The name of the telemetry parameter. This name must also be defined in the Telemetry Description Specification in combination with its telemetry parameter ID.
3. **DN/EU Indicator.** The units a delta limit value is defined as (i.e., raw data number or engineering units), where:

DN = raw data number.

EU = engineering units.

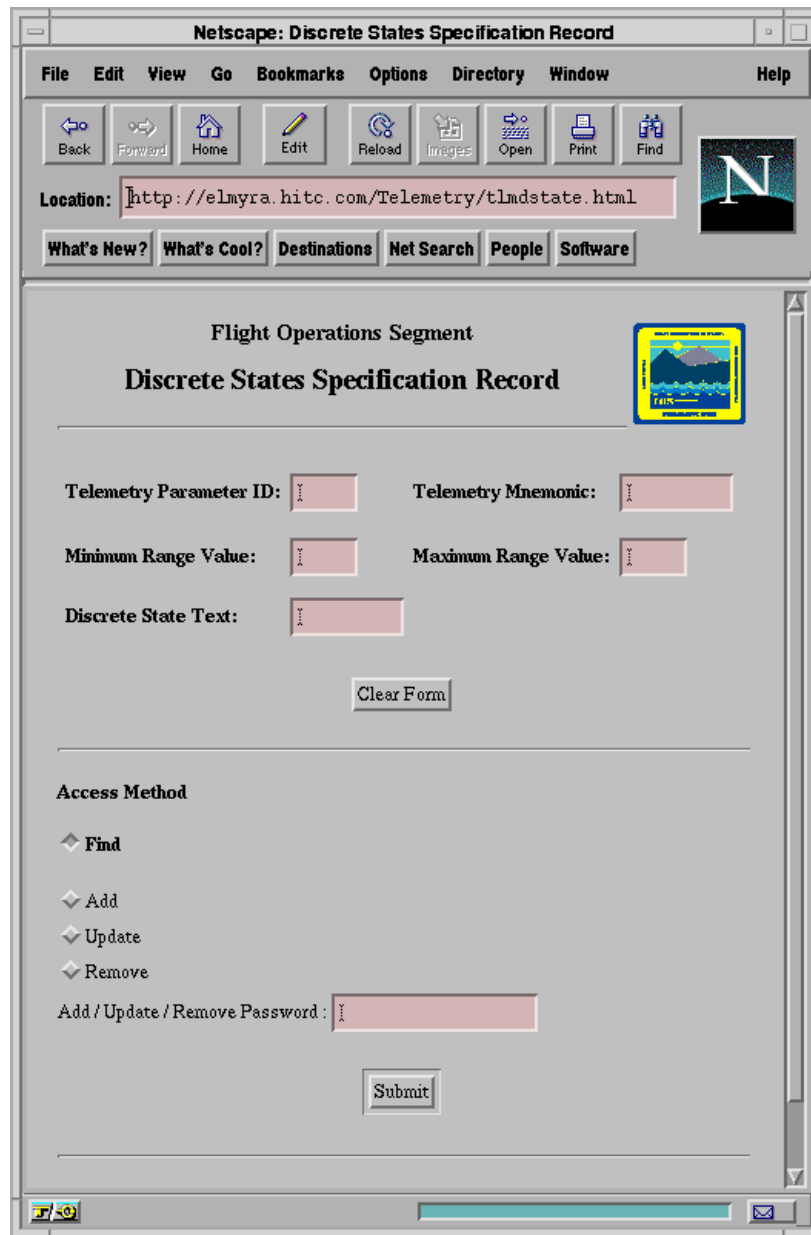
This field is only used for analog telemetry parameters, therefore the telemetry parameter must be of type analog. Additionally, a parameter with its delta limit expressed in EUs must specify a conversion type in its associated Telemetry EU Conversion Specification PDB.

4. **Delta Limit Value.** The maximum absolute successive change allowed for this telemetry parameter. The format for this field is determined by the DN/EU indicator. A DN/EU indicator set to DN indicates this value will be defined as a raw data number and contains a decimal integer. A DN/EU indicator set to EU indicates this value will be defined in EUs and contains a floating point number.



**Figure 10.4.4.4.3-9. Delta Limit Specification Page**

- I. **Discrete States Specification Record.** Open the Discrete States Specification Record page (see Figure 10.4.4.4.3-10) by clicking **Discrete States Specification** on the Telemetry Parameters page.



**Figure 10.4.4.4.3-10. Discrete States Specification Page**

The Discrete States Specification Record associates a single text state to a range of values for a discrete telemetry parameter. This text is the discrete state of the parameter and is used by the FOS User Interface Subsystem. Each discrete telemetry parameter may have up to 32 different ranges specified.

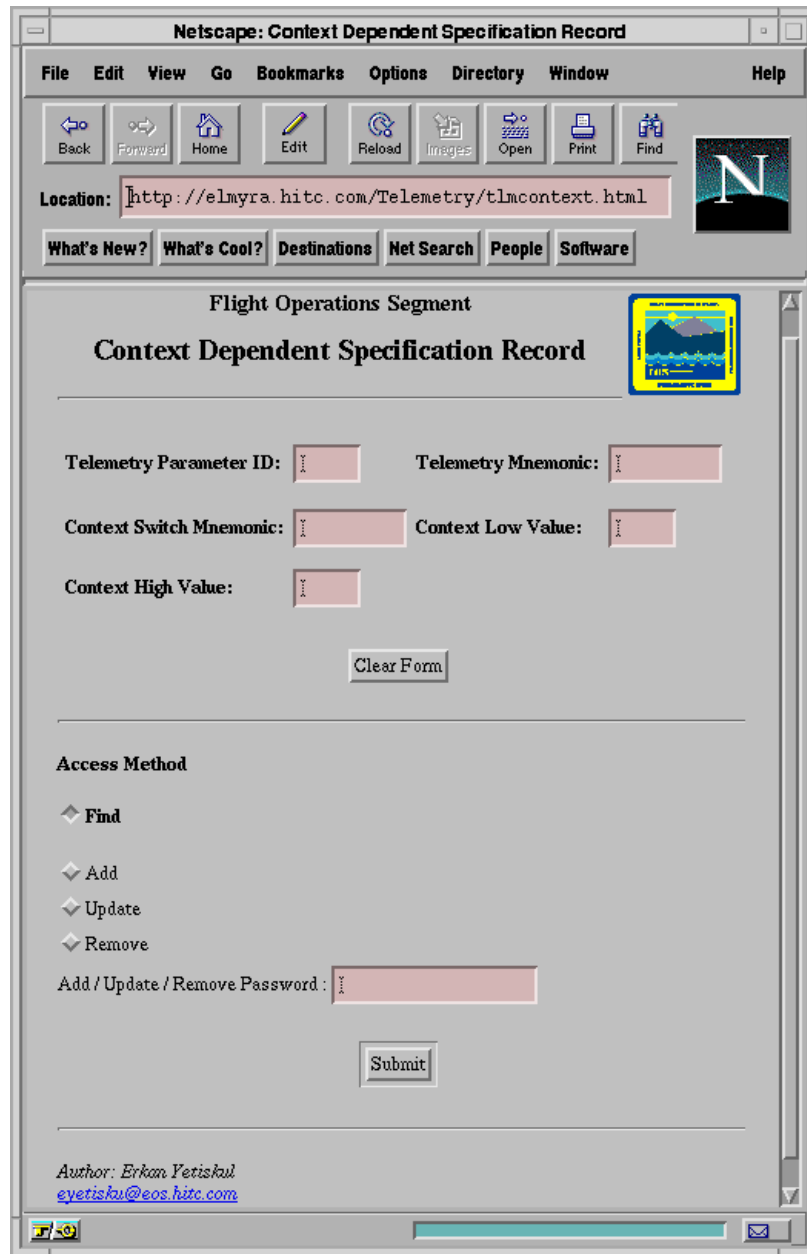
1. **Telemetry Parameter ID.** The discrete telemetry parameter. This value must also be defined in the Telemetry Description PDB and of the parameter type discrete.



2. **Telemetry Mnemonic.** The name of the telemetry parameter. This name must also be defined in the Telemetry Descriptor PDB in combination with its telemetry parameter ID.
  3. **Minimum Range Value.** The low-order end of the discrete range. The minimum range value must be less than or equal to the maximum range value.
  4. **Maximum Range Value.** The high-order end of the discrete range. The maximum range value must be greater than or equal to the maximum range value.
  5. **Discrete State Text.** The text associated with the discrete range.
- J. **Context Dependent Specification Record.** Open the Context Dependent Specification Record page (see Figure 10.4.4.4.3-11) by clicking **Context Dependent Specification** on the Telemetry Parameters page.

The Context Dependent Specification Record defines the condition in which a telemetry parameter is decommutated from its defined location. The value of a context switch parameter is used to determine whether the associated telemetry parameter will be decommutated. Each location may have up to 16 parameters defined using the context switch and a distinct range to identify it.

1. **Telemetry Parameter ID.** The number associated with the telemetry parameter. This value must also be defined in the Telemetry Description Specification PDB.
2. **Telemetry Mnemonic.** The name of the telemetry parameter. This name must also be defined in the Telemetry Description Specification PDB in combination with its telemetry parameter ID.
3. **Context Switch Mnemonic.** The telemetry parameter whose value determines whether decommutation of the telemetry parameter will be performed from its defined location. This name must be defined in the Telemetry Description PDB.
4. **Context Low Value.** The lower limit, inclusive, of the range of values of the context switch parameter for which the telemetry parameter will be decommutated. This value must be less than or equal to the context high value.
5. **Context High Value.** The upper limit, inclusive, of the range of values of the context switch parameter for which the telemetry parameter will be decommutated. This value must be greater than or equal to the context low value.



**Figure 10.4.4.4.3-11. Context Dependent Specification Page**

- K. **Derived Telemetry Specification Record.** Open the Derived Telemetry Specification Record page (see Figure 10.4.4.4.3-12) by clicking **Derived Telemetry Specification** on the Telemetry Parameters page.

**Netscape: Derived Telemetry Specification Record**

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Location: <http://elmyra.hitc.com/Telemetry/tlmdderived.html>

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**Flight Operations Segment**

**Derived Telemetry Specification Record**

Derived Parameter ID:  Derived Telemetry Mnemonic:

Derived Units:  Computation Rate:

Input Operand 1:  Input Operand 4:

Calibration Flag 1:  Calibration Flag 4:

Operator 1:  Operator 4:

Input Operand 2:  Input Operand 5:

Calibration Flag 2:  Calibration Flag 5:

Operator 2:  Operator 5:

Input Operand 3:  Input Operand 6:

Calibration Flag 3:  Calibration Flag 6:

Operator 3:

Clear Form

Access Method

**Figure 10.4.4.4.3-12. Derived Telemetry Specification Page**

The Derived Telemetry Specification Record defines simple equations that combine previously defined analogs, discretes, constants, and other derived parameters via arithmetic or logical functions. No inherent order of precedence exists, therefore, operators are evaluated in the order specified.

1. **Derived Parameter ID.** The number uniquely representing the derived parameter. This value is system generated.
2. **Derived Telemetry Mnemonic.** The name of the telemetry parameter whose value is derived from other existing parameters in a mathematical operation. This value must also be defined in the Telemetry Description Specification PDB.
3. **Derived Units.** The physical presentation of the derived telemetry parameter. This field will be used for display/reporting purposes only and therefore will not be validated.
4. **Computation Rate.** The rate at which the equation result is computed in seconds.
5. **Input Operands 1 through 6.** The telemetry parameter to be used in the mathematical equation. Valid parameters include analog, discrete, constant, or other derived parameters. This name must also be defined in the Telemetry Description Specification PDB if it is an analog, discrete, or derived parameter; or it must be defined in the Telemetry Constant Specification PDB if it is a constant parameter; or if defined as derived it must also be previously defined in the Derived Telemetry Specification PDB if it is another derived parameter.
6. **Calibration Flags 1 through 6.** Indicates whether the parameter represented by input operand 1 is to be calibrated, where:  
  
Y = yes, calibrate parameter.  
  
N = no, calibration not performed.  
  
Calibration is only performed on analog parameters. A value of Y is valid only when input operand 1 is an analog parameter.
7. **Operators 1 through 5.** The mathematical operator used within the mathematical equation. Valid operators include the following:  
  
+ addition  
- subtraction  
- negation  
\* multiplication  
/ division  
SIN sine  
ASIN arcsin  
COS cosine  
ACOS arccosine  
TAN tangent  
ATAN arctangent

= equal to

!= not equal to

< less than

<= less than or equal to

> greater than

>= greater than or equal to

&& logical AND

|| logical OR

! logical NOT

- L. **Telemetry Constant Specification Record.** Open the Telemetry Constant Specification Record page (see Figure 10.4.4.4.3-13) by clicking **Telemetry Constant Specification** on the Telemetry Parameters page.

The Telemetry Constant Specification Record defines the constant values required to support telemetry processing. Each record defines a constant value that may be provided as input into a derived equation.

1. **Telemetry Constant ID.** The number uniquely representing a constant value. This value is system generated.
2. **Telemetry Constant Mnemonic.** The constant value used with derived parameters, equation processing or as user-specified constants.
3. **Constant Type.** The data type of the constant, where:

UB = unsigned byte integer (8 bits)

UI= unsigned word integer (16 bits)

ULI = unsigned long word integer (32 bits)

SB = two's complement signed byte integer (8 bits)

SI = two's complement signed word integer (16 bits)

SLI = two's complement signed long word integer (32 bits)

1750 = single precision floating point in MIL-STD-1750A format (32 bits)

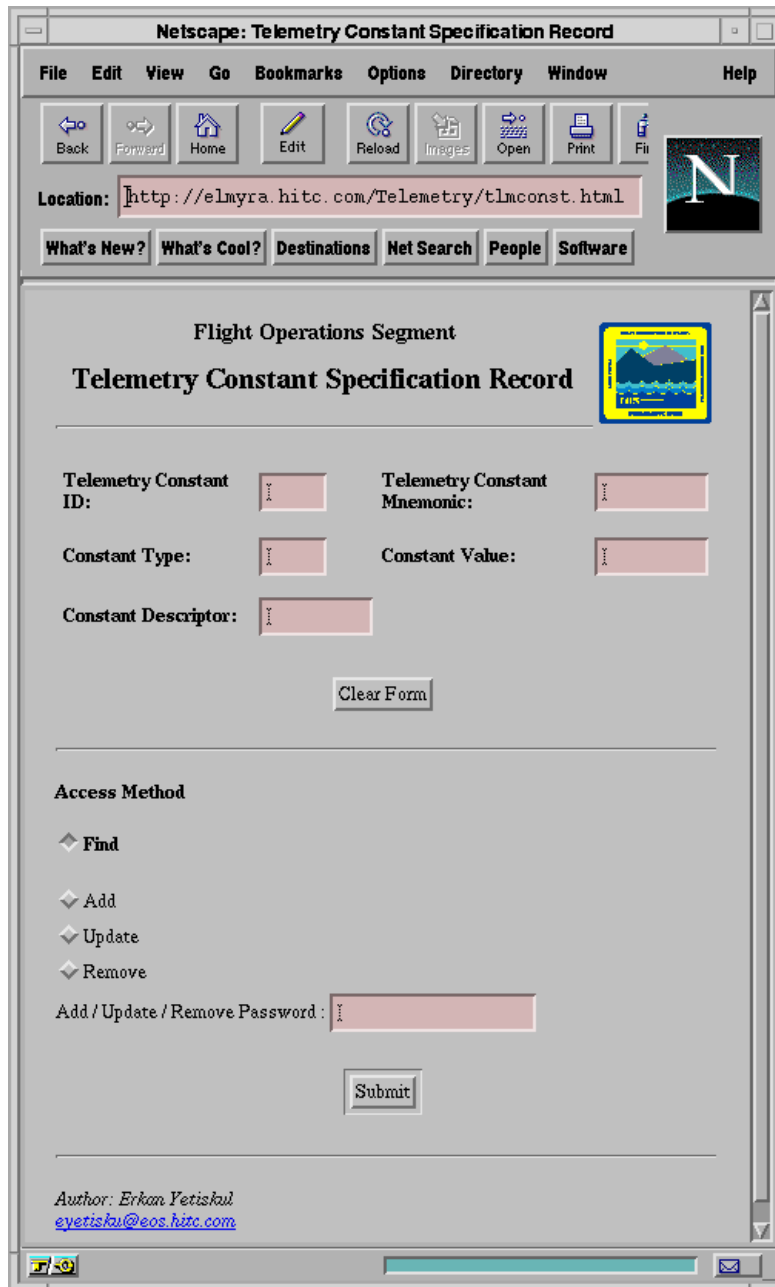
BOOL = Boolean value (5 bytes)

STIM = short time UTC format (32 bits)

TIME = standard time UTC format (64 bits)

DTIM = standard delta time format (64 bits)

CHAR = ASCII character string (23 bytes)



**Figure 10.4.4.4.3-13. Telemetry Constant Specification Page**

4. **Constant Value.** The default value assigned to the constant identifier. For constant types of integer, this value is considered a decimal integer value unless specified with the character "X" for hexadecimal or "O" for octal. For constant types of Boolean, acceptable values are TRUE or FALSE. For constant types of time, the format of the constant value is:

YY:DDD:HH:MM:SS.mmm.uuu

where:

YY = year (95-99 for 1995-1999, 00-50 for 2000-2050)

DDD = day (001-366)

HH = hour (00-23)

MM = Minute (00-59)

SS = second (00-59)

mmm = millisecond (000-999)

uuu = microsecond (000-999)

5. **Constant Descriptor.** Textual information describing the telemetry constant.

#### 10.4.4.5 Parameter Definitions

Open the Parameter Definitions page (see Figure 10.4.4.5-1) by clicking **Parameter Definitions Specification** on the Database Access page (see Figure 10.4.4-1).

The Parameter Definitions page allows you to access all parameters in the system. The following fields are included on the Parameter Definitions page:

1. **Mnemonic.** Valid mnemonics start with "Subsystem\_". Valid subsystem identifiers are AST, CEA, CEF, CDH, COM, EAS, EPS, FS1, FS2, GNC, MIS, MOD, MOP, PMS, SMS, and TCS FDF.
2. **Parameter Type.** The type of parameter. Valid parameter types are Analog Integer (AI), Analog String (AS), Analog Real (AR), Discrete (DS), and List.
3. **Unit Type.** The type of unit. Examples of unit types are Mass, Length, Value, and Current.
4. **PDB Pid.** The number uniquely identifying the Project Database parameter definition. Only valid for spacecraft mnemonics.
5. **External Unit.** The type of unit displayed.
6. **FOS PID.** The number uniquely identifying the mnemonic.
7. **Internal Unit.** The type of unit processed internally to the FOS.
8. **Sig Figures.** The number of significant units to be displayed.
9. **Active Flag.** Indicates if the parameter is active for the current database.
10. **Source.** Option field.
11. **Description.** A description of the mnemonic.

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### Parameter Definitions

Parameter Definition Fields (empty fields and \* are wild-carded)

Mnemonic

Parameter Type  Unit Type

PDB PID #  External Unit

Acceleration - meters/SecSq

FOS PID #  Internal Unit

Acceleration - meters/SecSq

Sig. Figures  Active Flag  Source

Description

Clear Form

Access Method

**Figure 10.4.4.5-1. Parameter Definitions Page**



#### 10.4.4.6 Spacecraft Orbital Events

Open the Spacecraft Orbital Events page (see Figure 10.4.4.6-1) by clicking **Spacecraft Orbital Events** on the Database Access page. The Spacecraft Orbital Events page allows you to access the Orbit Events Database.

Netscape: Spacecraft Orbital Events

File Edit View Go Bookmarks Options Directory Window Help

Back Forward Home Edit Reload Images Open Print

Location:

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Flight Operations Segment  
Spacecraft Orbital Events

Orbit Event Fields (empty fields are wild-carded)

Event

Spacecraft

Orbit Number  (of Day)

Sequence Number

Clear

Access Method

☐ Find  
☐ Add  
☐ Remove

Remove Password:

Submit

Author: Ken Fregeolle  
kfregeol@eos.hitc.com

Figure 10.4.4.6-1. Spacecraft Orbital Events Page

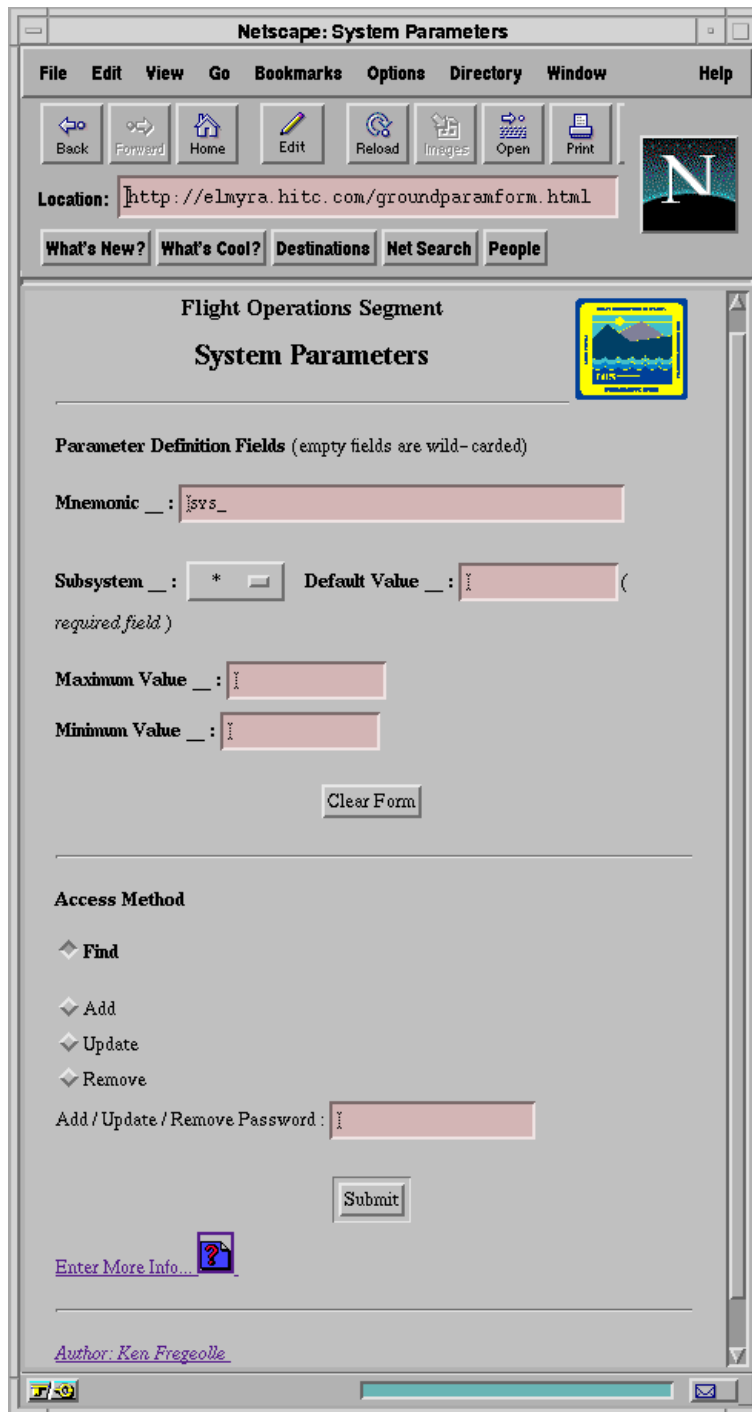
The following fields are included on the Spacecraft Orbital Events page:

1. **Event.** The actual orbital event (e.g., Acquisition of Signal, Spacecraft Noon, and Spacecraft Day/Night).
2. **Spacecraft.** The spacecraft. The valid spacecraft is currently AM1.
3. **Orbit Number.** The orbit and day of an event.
4. **Sequence Number.** The sequence within an orbit an event occurs.

#### 10.4.4.7 System Parameters

Open the System Parameters page (see Figure 10.4.4.7-1) by clicking **System Parameters** on the Database Access page. The System Parameters page allows you to access all system parameters in the PDB. The following fields are included on the System Parameters page:

1. **Mnemonic.** Valid mnemonics start with "sys-".
2. **Subsystem.** The subsystem owner of the mnemonic. Valid values are 1-10 as follows:  
1= ANA; 2=CMD; 3=CMS; 4=DMS; 5=FUI; 6=PAS; 7=RCM; 8=RMS; 9=SYS;  
10=TLM.
3. **Default Value.** Default value of the parameter.
4. **Maximum Value.** Maximum value for the parameter.
5. **Minimum Value.** Minimum value for the parameter.



**Figure 10.4.4.7-1. System Parameters Page**

### 10.4.5 Database Reports

Reports can be generated by the DBA or users. The user and the DBA can perform the same function with regards to viewing, generating and printing reports. The user can access the Database Utilities (User) window shown in Figure 10.4.-2. The DBA can open the Database Reports pages (see Figure 10.4.5-1) by clicking **Database Reports** on the Database Utilities page (see Figure 10.4-1). Reports may be generated, viewed, or printed. The reports that may be generated are shown in Figures 10.4.5-2 through 10.4.5-9. To view a report, select the report type on the View Database Reports page (Figure 10.4.5-10) and enter the report name from the list of available reports on the View Database Reports Selection page (Figure 10.4.5-11). The report will be displayed as shown in Figure 10.4.5-12.

To print a report, select the report type on the Print Database Reports page (Figure 10.4.5-13) and enter the report name from the list of available reports on the Print Database Reports Selection page (Figure 10.4.5-14).



**Figure 10.4.5-1. Database Reports Page**



**Figure 10.4.5-2. Generate Database Reports Page**



**Figure 10.4.5-3. PDB Database Reports Page**



**Figure 10.4.5-4. Load Catalog Database Reports Page**





**Figure 10.4.5-5. FDF Database Reports Page**



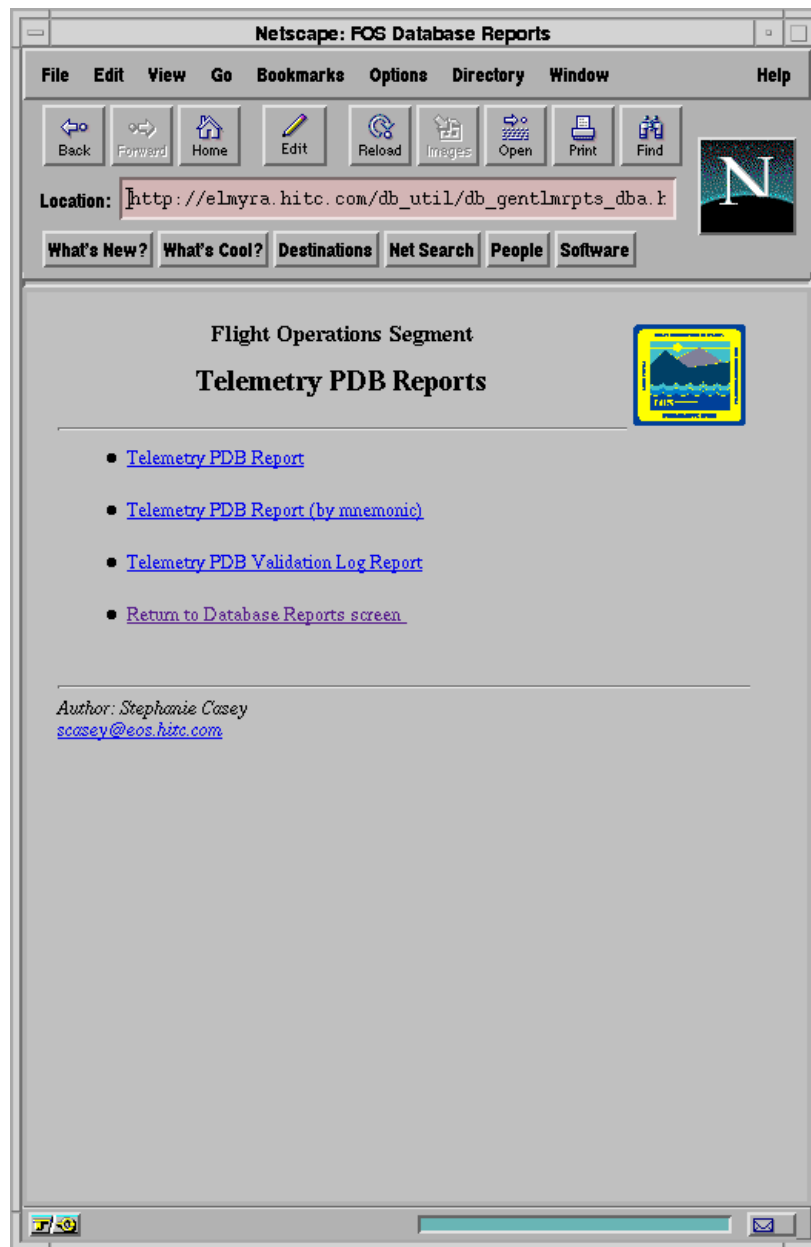
**Figure 10.4.5-6. View Database Reports Page**



**Figure 10.4.5-7. View Database Reports Selection Page**



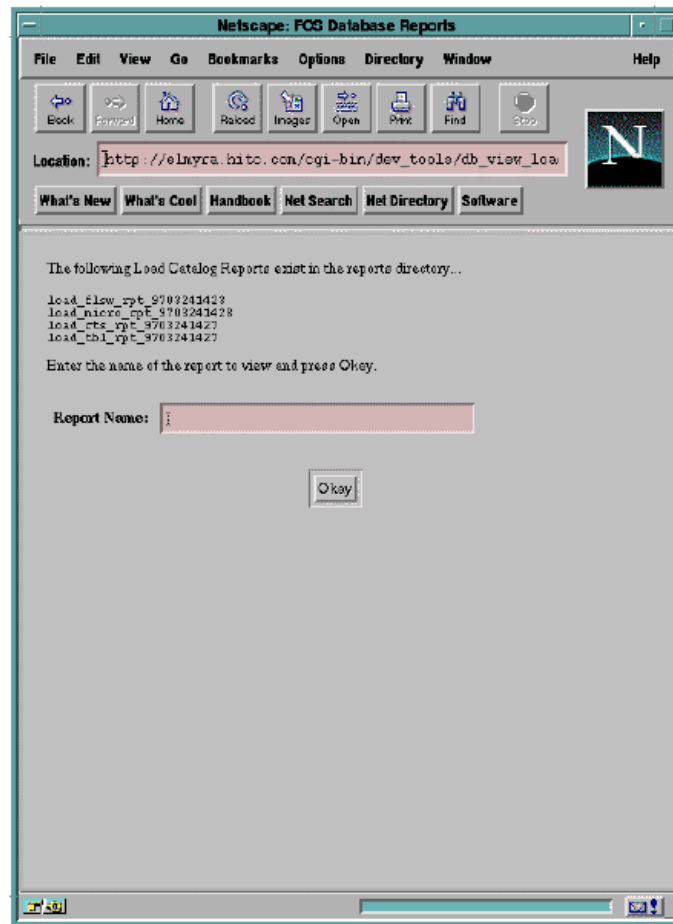
**Figure 10.4.5-8. Flight Software Load Catalog Report View Page**



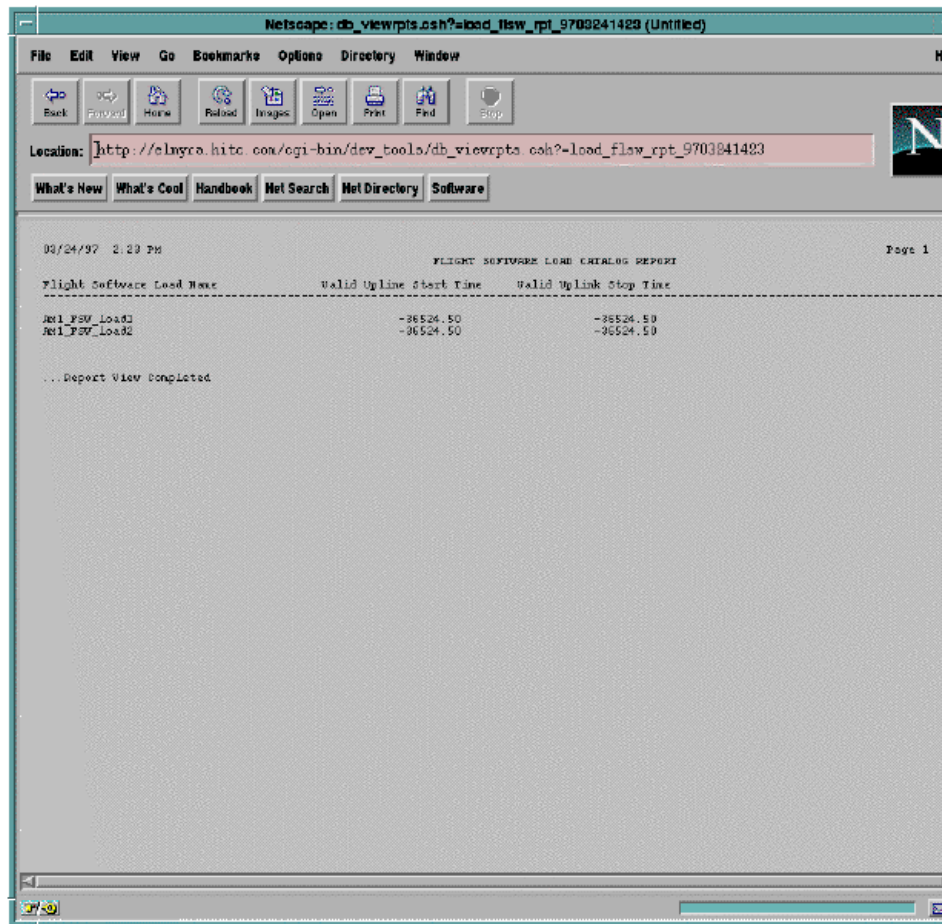
**Figure 10.4.5-9. Print Database Reports Page**



**Figure 10.4.5-10. Print Database Reports Selection Page**

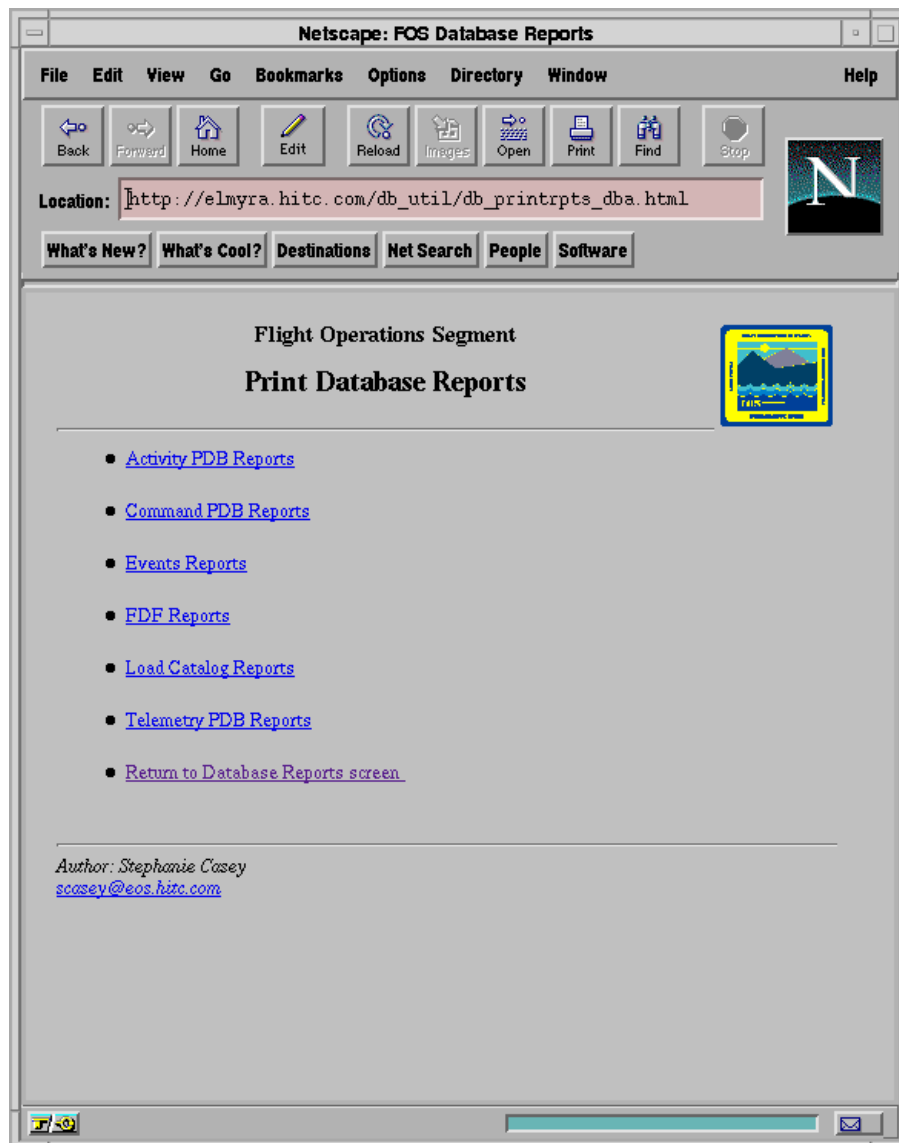


**Figure 10.4.5-11. View Database Reports Selection Page**

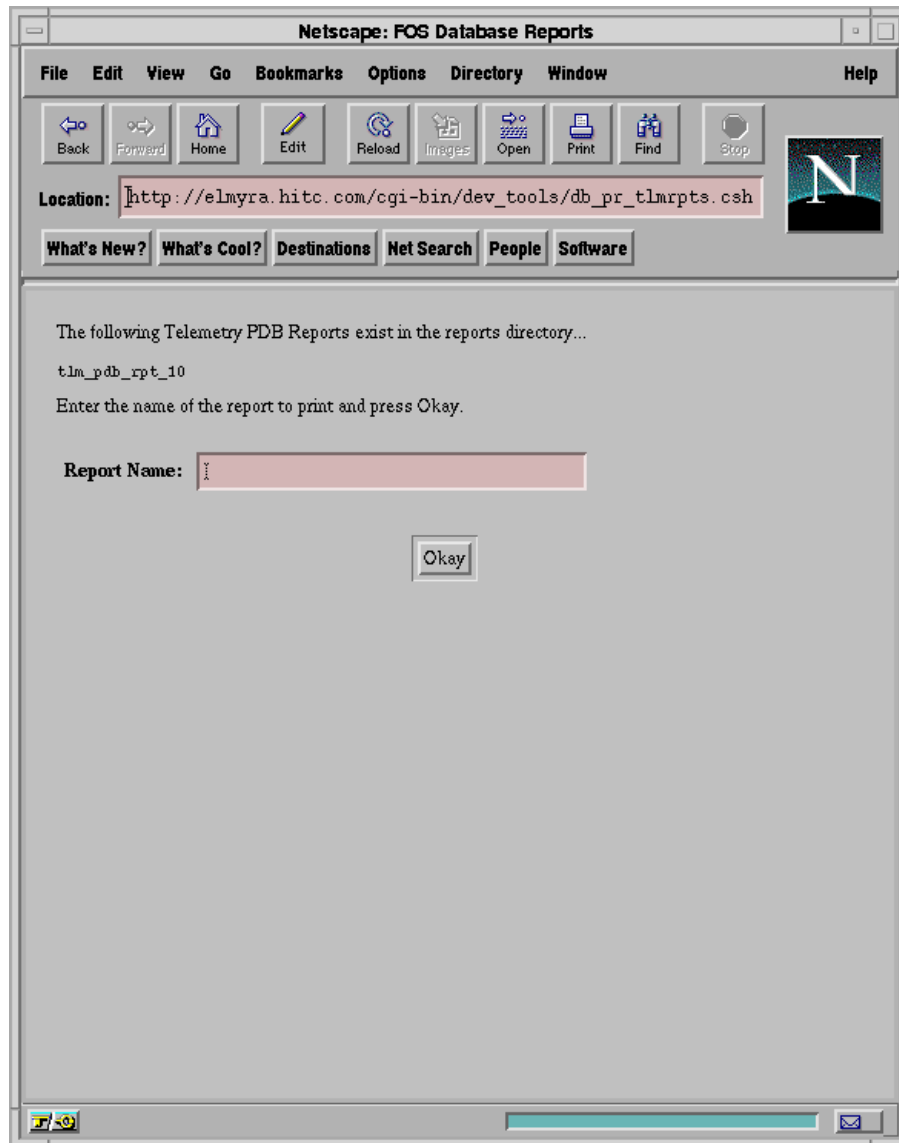


**Figure 10.4.5-12. Flight Software Load Catalog Report View Window**





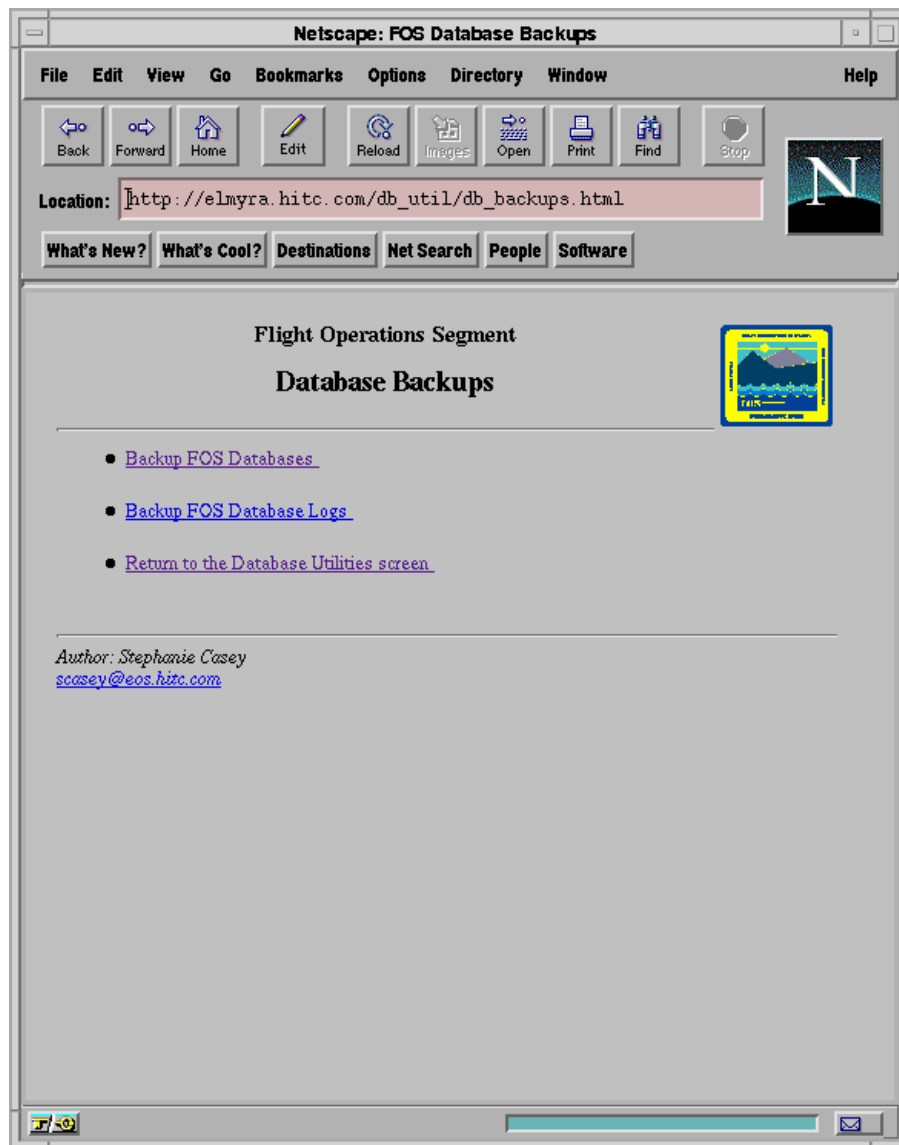
**Figure 10.4.5-13. Print Database Reports Page**



**Figure 10.4.5-14. Print Database Reports Selection Page**

#### **10.4.6 Database Backups**

Open the Database Backups page (see Figure 10.4.6-1) by clicking **Database Backups** on the FOS Database Utilities page. Database backups should be done weekly and backups of the transaction logs should be done nightly by the DBA.



**Figure 10.4.6-1. Database Backups Page**